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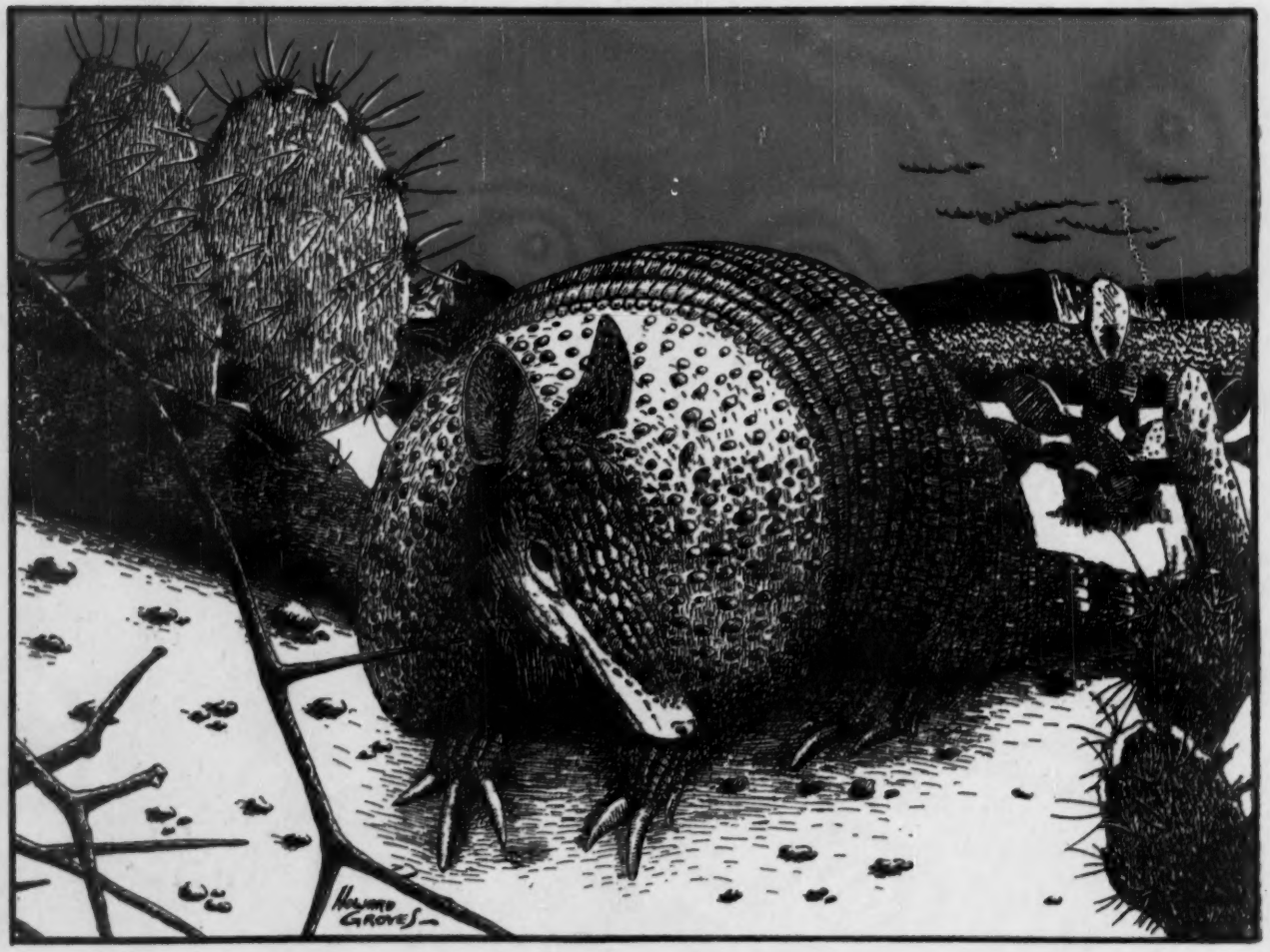

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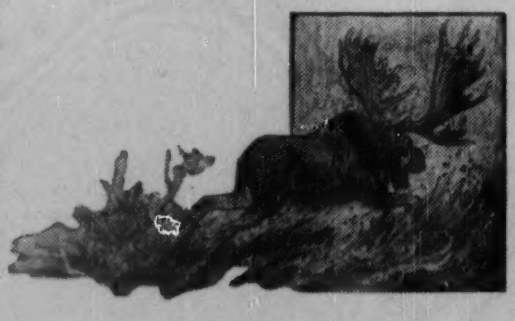

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Nature in Print

By HOWARD ZAHNISER

OUR CONCERN with conservation in recent years has sometimes seemed to be characterized less and less by compassion for other forms of life and more and more by thought for our own human welfare. *Road to Survival*, for example, was the title of the first modern book on a conservation theme that became a "best seller." In this dramatic work William Vogt turned the attention of many Nature enthusiasts to a deep postwar anxiety for their own human world. It was not the survival of "vanishing species" that was along the road of Mr. Vogt's best seller, but the survival of man himself. The student of Nature had become important because he could outline the morality of ecology and could prophesy on man's place in the universe. Conservation had become practical. Conservationists were transformed from sentimentalists to realists; from pleaders to alarmists; from "idealists" to the most practical of men.

In a sense this apparent development is doubtless "progress." It is good and sound to realize that an interest in birds and in other forms of wildlife, and in the world of Nature as it may be considered the work of God, is a recognition of our own true human interest. It seems good to consider ourselves as members of a community of life that embraces the earth and to see our own welfare as arising from the prosperity of the community. Yet there may be danger in too conscious, too deliberate, too intent an effort to see all in terms of our own welfare. There may be grave danger in the impulse that would lead to the destruction of another form of life for the exploitation of our own. To seek our own welfare in the welfare of all is one thing; to insist on gratifying our desires at the rueful expense of fellow creatures is another. Conservation is, of course, practical, but most truly so it is likewise idealistic.

With these intimations, these not-fully-developed thoughts, in the mind's background, it has seemed, during the past few months, more clearly than ever that conservationists—including the preservationists—are dealing with problems that have an importance that is indeed fundamental to man. It does not seem an adequate motive to conserve a waterfowl "resource," as it is called, in order to have fun shooting some of its individuals, or simply to enjoy their presence, or even more broadly to have a better world for man himself. Yet waterfowl conservation does serve these purposes, and, furthermore, in the opinion of some men and women, the conditions that make for waterfowl conservation make also for human welfare. The question is: Would all these purposes be best served if a true interest in the waterfowl as waterfowl, as fellow creatures with man, were at the center of their conservation? Jesus suggested that self-seeking is not the way to self-realization, but that, not deliberately but through indirection, human beings realize their best welfare by losing sight of themselves. It is a great satisfaction to be able to demonstrate to another that an unspoiled wilderness is important because it serves man's need for "escape," but going to the wilderness to escape from something is no certain way of ever actually being in the wilderness at all. The only way to escape from one's self in the wilderness is to lose one's self there, but more realistically still the true wilderness experience is one, not of escaping, but of finding one's self by seeking the wilderness. The sum of this moralizing may be in forsaking human arrogance and courting humility in a respect for the community and with regard for the environment. The impression remains deep and abiding that these concerns with conservation are of central human importance.

Perhaps the best of all the recent books in which to pursue these concerns, and with which to implement an interest in man's total welfare, is Harrison Brown's *The Challenge of Man's Future: An Inquiry Concerning the Condition of Man During the Years that Lie Ahead.* Much of the research and study preliminary to its writing, we are told, was done while the author was a member of the staff of the Institute for Nuclear Studies of the University of Chicago. "A large part" of it, says the first sentence in the preface, was "written on a porch overlooking Ocho Rios Bay on the island of Jamaica." These sound at the outset like propitious circumstances for study and for writing. The book, its preface tells us further, "represents an attempt to examine man's past and present and, on the basis of the clues derived from such a study, to examine his future." The understanding of present problems, which Dr. Brown realizes is the "first step toward wise action in the future," he sees as dependent on "an understanding of the relationships between man, his natural environment, and his technology." This due emphasis on natural environment is characteristic of the book.

Dr. Brown visualizes the future course of history as "determined by the rates at which people breed and die, by the rapidity with which non-renewable resources are consumed, by the extent and speed with which agricultural production can be improved, by the rate at which the underdeveloped areas can industrialize, by the rapidity with which we are able to develop new resources, as well as by the extent to which we succeed in avoiding future wars." Realizing that "these factors are interlocked," he considers them separately, for their better understanding, in chapters that are amazingly rich in factual detail and in interpretive brilliance—chapters entitled "Vital Statistics," "Food," "Energy," and "Things."

In a concluding chapter on "Patterns of the Future" he sees "the possibility of the emergence of any of three possible patterns of life.

"Most likely. . .is a reversion to agrarian existence. . .the pattern which will almost certainly emerge unless man is able to abolish war." A second possible pattern is "the completely controlled, collectivized industrial society." But "the third possibility confronting mankind," which Dr. Brown sees and which stirs our hope, "is that of the world-wide free industrial society in which human beings can live in reasonable harmony with their environment."

It is this vision of harmony with the environment and its deep current need that brings this book on *The Challenge of Man's Future* to attention on this page. In the volume's early pages Dr. Brown calls special attention to man's "power of conceptual thought," which he calls "a tool that no animal had possessed before him." A reader is reminded of this as he reads the book's concluding pages, and senses the power of the concepts that man has formed. Dr. Brown might, for example, have cited the

Sky

By CATEAU DE LEEUW

Out in the lonely places is the sky,
Ageless and changing, answering the "why"
Man asks of the unheeding earth and sea,
Offering him beauty and variety.
Merely by looking up he can discern
The endless patterns as the seasons turn:
Small puffs and frills of white to trim the spring;
The autumn's blue, chevroned with birds a-wing;
A summer thunderhead's dense threatening mass;
The cold and wintry gray that frosts the grass;
Thin veils of cloud enchantment softly drawn
To screen the poignant beauty of the dawn;
The spattered stars, all winking sequin bright
Against the velvet of a friendly night;
And always, always, the celestial bowl
Inverted to pour peace into man's soul.
How can a city dweller know the balm
Which comes from this immensity, this calm,
Whose heaven, smudged by smoke and striped
with wires,
Is trapped in patches between concrete spires?

efficacy of the concept of a "wilderness area" as a human means for meeting the human threat to destroy all wilderness. He does truly inform our understanding and enlighten our vision, and his volume is to be commended for thoughtful reading.

Four paragraphs, concluding a section in the book's final chapter, so well express the essence of the interest that so many of us share with Harrison Brown that these paragraphs must be quoted and, I trust, reread and pondered. Here they are:

"The machine has divorced man from the world of nature to which he belongs, and in the process he has lost in large measure the powers of contemplation with which he was endowed. A prerequisite for the preservation of the canons of humanism is a reestablishment of organic roots with our natural environment and, related to it, the evolution of ways of life which encourage contemplation and the search for truth and knowledge. The flower and vegetable garden, green grass, the fireplace, the primeval forest with its wondrous assemblage of living things, the uninhabited hilltop where one can silently look at the stars and wonder—all of these things and many others are necessary for the fulfillment of man's psychological and spiritual needs. To be sure, they are of no 'practical value' and are seemingly unrelated to man's pressing need for food and living space. But they are as necessary to the preservation of humanism as food is necessary to the preservation of human life.

"I can imagine a world within which machines function solely for man's benefit, turning out those goods which are necessary for his well-being, relieving him of the necessity for heavy physical labor and dull, routine, meaningless activity. The world I imagine is one in which people are well fed, well clothed, and well housed. Man, in this world, lives in balance with his environment, nourished by nature in harmony with the myriads of other life forms that are beneficial to him. He treats his land wisely, halts erosion and over-cropping, and returns all organic waste matter to the soil from which it sprung. He lives efficiently, yet minimizes artificiality. It is not an overcrowded world; people can, if they wish, isolate themselves in the silence of a mountaintop, or they can walk through primeval forests or across wooded plains. In the world of my imagination there is organization, but it is as decentralized as possible, compatible with the requirements for survival. There is a world government, but it exists solely for the purpose of preventing war and stabilizing population, and its powers are irrevocably restricted. The government exists for man rather than man for the government.

"In the world of my imagination the various regions are self-sufficient, and the people are free to govern themselves as they choose and to establish their own cultural patterns. All people have a voice in the government, and individuals can move about when and where they please. It is a world where man's creativity is blended with the creativity of nature, and where a moderate degree of organization is blended with a moderate degree of anarchy."

"Is such a world impossible of realization?" asks Dr. Brown, and he goes on: "Perhaps it is, but who among us can really say? At least if we try to create such a world there is a chance that we will succeed. But if we let the present trend continue it is all too clear that we will lose forever those qualities of mind and spirit which distinguish the human being from the automaton."

Thus Harrison Brown commends himself to our attention and interprets to us *The Challenge of Man's Future*.

The Challenge of Man's Future: An Inquiry Concerning the Condition of Man During the Years that Lie Ahead. By Harrison Brown. New York: The Viking Press. 1954. xii + 290 pp. (5¾ by 8 5/8 in.) with 31 text figures, bibliography, and index. $3.75.

The Buffalo Trace

The Buffalo Trace. By Virginia S. Eifert. New York. 1955. Dodd, Mead and Company. 192 pages. Illustrated by Manning de V. Lee. $3.00.

The title of this book was the title of the leading article in the February, 1955, issue of *Nature Magazine*. In this article Mrs. Eifert condensed the story of the Buffalo Trace and the pioneers who traveled over this route, treating it from the Nature viewpoint. Now comes the book, for which, we are sure, the appetite of many readers was whetted by our feature. Here we have the story of the ancestors of Abraham Lincoln; of the Abraham Lincoln who sold his Virginia farm to go to Kentucky and carve a home from the wilderness. It is the story, also, of Daniel Boone and the Hanks family, and the others who pioneered. Mrs. Eifert has written many Nature articles, but also has a fine flare for fiction and for historical research. For this book she will have a large audience, and an appreciative one, we are certain.

Last of the Curlews

Last of the Curlews. By Fred Bosworth. New York. 1955. Dodd, Mead and Company. Illustrated by T. M. Shortt. 128 pages. $3.00.

Time was when the Eskimo curlews, in flying flocks, darkened the sun as they made their epic flights from the Arctic Circle to the Antarctic tip of South America. That day is long gone, due to the hand of man raised against these birds that never learned to fear the greatest predator of all. This eloquent and beautifully written and illustrated story may, indeed, be an epitaph for a bird that is on the verge of extinction.

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Internationally

From the headquarters of the International Union for the Protection of Nature, 42 Rue Montoyer, Brussels, Belgium, come several publications of importance in international conservation. Largely in Spanish is the report of the Technical Meeting of IUPN held in Caracas, Venezuela, in 1952. This brings together the proceedings and papers of that meeting and is available for five dollars. In 1953 a technical meeting of the Union was held in Salzburg, Austria, and the Proceedings and Papers of that meeting, in French, German and English, are available at two dollars. In 1950 the Union published a book on the Position of Nature Protection throughout the World in 1950, copies of which are available at four dollars, and this is now supplemented by an addendum of 150 pages that is available at $1.50. Other publications available include the Proceedings and Reports of the meeting at Lake Success, New York, in 1949 ($3.50); Proceedings and Reports of the General Assembly in Brussels, 1950 ($1.00); Proceedings of the Technical Session at The Hague, 1951 ($1.00); A Guide to Conservation (English Edition, $1.00). The Union also has a limited number of copies of the proceedings of the Third International Conference on the Protection of the Fauna and Flora of Africa, in French and English, held at Bukava, Belgian Congo, in 1953, These are available free only to those to whom they will serve a truly useful purpose.

Mammals

List of North American Recent Mammals. By Gerrit S. Miller, Jr., and Remington Kellogg. Washington, D. C. 1955. Smithsonian Institution. 954 pages. $3.50.

This important reference work summarizes the results of taxonomic studies of North American Recent mammals up to January 1, 1953. It also indicates the forms represented in the collection of the United States National Museum. Geographically it covers the entire continent from Panama northward, and includes Greenland, the Greater Antilles and the Lesser Antilles south to Grenada. This is a taxonomy for the naturalist and not intended for lay use.

Biltmore

The Biltmore Story. By Carl Alwin Schenck. St. Paul 1, Minnesota. 1955. American Forest History Foundation. 224 pages. Illustrated. $3.95.

The roots of forestry in the United States were nurtured in the soil of the Biltmore Estate near Asheville, North Carolina, where the baronial home of George W. Vanderbilt was surrounded by private woodlands where scientific forestry was first applied by Gifford Pinchot. Dr. Schenck, a German forester, and a colorful and controversial figure in our early forest history, took over management of these woodlands in 1895, and became the founder and director of the Biltmore Forest School. This was the first forestry school in the United States. This book presents Dr. Schenck's recollections of those days, and of the men who dominated forestry then, and of whom he is the last survivor. This is valuable history and most interesting reading to anyone concerned with the early days of conservation in our country.

Mark Trail's Mammals

Mark Trail's Book of North American Mammals. By Ed Dodd. New York. 1955. Hawthorn Books, Inc. 242 pages. Illustrated by the author. $1.95.

This is a picture book about the mammals of North America and contains a minimum of text. It brings together in book form much material that the creator of Mark Trail has included in his newspaper strip on Sundays, when he lays aside the adventures of Mark for presentation of natural history information. There has been demand for this material in one place, hence this little, pocket-size book, which, we gather, is a precursor of other books to come.

Slim Green

Slim Green. By Louise Dyer Harris and Norman Dyer Harris. Boston. 1955. Little, Brown and Co. 53 pages. Illustrated by Robert Candy. $2.00.

Slim Green is a green snake. In the course of his life, as told in this fine little story for the younger audience, he meets quite a company of interesting wild folk. The authors of this book are a mother-son team; the mother a writer and the son Director of Education at the Museum of Science in Boston. They collaborate to produce a story that cannot but inspire greater appreciation of snakes as a part of our fauna.

Pole Traps

In Burlington County, New Jersey, the Garden State Beagle Club maintains a hunting preserve where the members like to hunt rabbits with their beagles. Convinced that great horned owls and some hawks were taking rabbits on the preserve, pole traps were placed atop poles to catch the offenders. These traps are forbidden by State law. Word of this got to the New Jersey Audubon Society, whose field representative investigated and found trapped birds, their legs broken and their bodies dangling. At the foot of the poles were the remains of various birds that had been earlier victims of the traps. The club was fined $240 for this illegal and inhumane practice.

Milford Conservationists

Congratulations to the students of the elementary school of Milford, Utah, on their issue of *The Milford Siren* devoted entirely to conservation. The students wrote it all and illustrated it, and prove themselves to be real conservationists.

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THE MOCCASIN FLOWER

A Chippewa legend retold

***By* Louise J. Walker**

THE Indians did not like to have their children marry people of other races. Most Indian braves married squaws of their own tribe or of a neighboring one. Once a long time ago, a white man fell in love with a very beautiful Indian girl. He saw her first when he came to the village. He bought furs from her father who was a trapper. He liked her smile and her long black hair. He knew she would make a good wife for she was always busy and happy. She made beautiful baskets. The Indian girl like the white man too. He was very kind to her.

When these lovers got married, the bride's parents were very angry. In fact, all of the Indians in the village were displeased. They would have nothing to do with the white man. The girl's parents said to her husband, "Leave this village at once, and never come back!" Then they turned to their daughter and exclaimed, "Unless you leave this pale face, you may never come home again! We will have nothing more to do with you. You have done wrong. You have shamed us. The white man has cowardly blood in his veins."

In spite of the girl's tears, all the Indians were firm. They said that the white man must leave. At last, he started away in his canoe. He was very sad, for this man loved his Indian wife very much. He did not want to go away. The unkind words of the Indians hurt his feelings. When the wife knew that her husband had gone, she set out to follow him. She followed along the shore of the lake all one day. She tried to call him back. When night came, she felt faint and very tired. Still she continued to follow and call out to him. At last, she could go no farther. She fell down for weariness had overcome her. All night long, the owls echoed her calls to her banished husband. The next day, flowers that looked like her moccasins were found all along her track. We call them white lady slippers. The Indians call them "koko-ko-ko moccasins," which means owl shoes.

Briefly Noted

Garden Friends and Foes. By Richard Headstrom. New York. 1954. David McKay Company. 219 pages. $3.50. This excellent guide to wooing bird and other friends of the garden, and defeating foes, originally appeared at an unfortunate time of the year. We call attention to it again at a more appropriate moment seasonally.

Sally Sponge and Sammy Seahorse. By Mildred J. Woodall. New York. 1955. Greenwich Book Publishers. Illustrated by Helen Ludwig. $2.00. A first-grade teacher in Florida tells two stories for youngsters about two interesting creatures of the briny.

Concerning Christopher. By Dorothy L. Cutting. New York. 1955. Exposition Press. 42 pages. $2.50. An entertaining little story of a personable parrot.

Development of Color in Budgerigars By E. W. Brooks. Fond du Lac, Wisconsin. 1955. All-Pets Books. 48 pages. $2.00. A thorough analysis of the evolution of color in "Budgies," past and present, and techniques of breeding for color.

The Elements of Chromatography. By T. I. Williams. New York. 1955. Philosophical Library. 90 pages. $3.75. Illustrated. A completely new book on this subject, bringing up to date developments since 1946.

Science and the Human Imagination. By Mary B. Hesse. New York. 1955. Philosophical Library. 171 pages. $3.75. A discussion of aspects of the history and logic of physical science.

Forbidden Lands. By Gordon Cooper. New York. 1955. Philosophical Library. 165 pages. Illustrated. $4.75. Story of some of the spots on the earth still virtually inaccessible to man.

Man Meets Dog. By Konrad Z. Lorenz. Boston. 1955. Houghton Mifflin Company. 211 pages. $3.00. A book about the relationship of dog to man, historically and today, by an authority.

What's Inside. By May Garelick. New York. 1955. William R. Scott, Inc. Illustrated by Rena Jakobsen. $2.00. A "Young Scott Book" about what comes out of the egg.

The Flower. By Mary Louise Downer. New York. 1955. William R. Scott, Inc. Illustrated by Lucienne Bloch. $1.75. The story of a seed and how it grew. For the quite young reader.

Introduction to Physical Geology. By Chester R. Longwell and Richard Foster Flint. New York. 1955. John Wiley and Sons. 432 pages. Illustrated. $4.95. A textbook that supplies a new approach to this field and a concise, clear, and modern development of principles and processes.

In Ponds and Streams. By Margaret Waring Buck. Nashville 2, Tenn. 1955. Abingdon Press. 72 pages. Illustrated by the author. Cloth, $3.00; paper, $1.75. A charmingly written and illustrated introduction to the varied life that may be observed in ponds and streams and from their banks.

The Handy Book of Gardening. By Albert E. Wilkinson and Victor A. Tiedjens. New York, 1955. New American Library of World Literature. 206 pages. $.35. A Signet Key Book reprinting the original edition by the same title brought out by Doubleday and Company.

The Romance of Trees in Fact and Fancy. By Mary Funk Hazel. 1717 R. St., N. W., Washington, D. C. 1955. Published by the author. 117 pages. Illustrated. $2.50. Prose and poetry about trees, romantically, seasonally and otherwise.

Freshwater Fishing and Fishlife in Virginia. Compiled and edited by J. J. Shomon. Richmond, Va. 1955. Commission of Game and Inland Fisheries. 104 pages. Illustrated in color and black and white. $.25. Excellent booklet on the subject indicated by its title.

Poems of Sun and Snow. By Marian Storm. Mexico City 1, Av. Medero 25. 1955. $1.50. This is a collection of fine and inspiring poetry by this author-poet-humanitarian.

Introducing Sea Shells. By R. Tucker Abbott. New York. 1955. D. Van Nostrand. 64 pages. Illustrated in color and black and white. $2.50. By the author of *American Seashells*, this is a popular introduction to the collection of these shells.

Warmer Weather—Boom in North. By William J. Baxter. New York. 1955. International Economic Research Bureau, 68 Williams Street, New York, 5, N. Y. 92 pages. Illustrated by Virgil Partch. $1.00. This is an interesting discussion of weather changes and their impact economically, as this provocative author sees them.

Bulletins

"Timber in Humboldt County" by Henry J. Vaux discusses the situation in a California county that has grown up around its lumber industry. Published by the Division of Agricultural Sciences, University of California, Berkeley, Calif.

"Control Peppermint Diseases" by C. E. Horner is Station Bulletin 547 of the Agricultural Experiment Station, Oregon State College, Corvallis, Oregon.

"Red Rot of Ponderosa Pine" by Stuart R. Andrews is Agricultural Monograph No. 23 of the U. S. Forest Service, available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 30 cents.

"Canada's Atlantic Salmon" by F. H. Wooding is a popular, illustrated bulletin discussing these fishes, and is available for 25 cents from the Supervisor of Government Publications, Department of Public Printing and Stationery, Ottawa, Canada.

"Children's Books for Nature Study" is the subject of Volume 1, No. 3 of *The Kansas School Naturalist*, published by the Kansas State Teachers College, Emporia, Kansas. Free to Kansans; 25 cents to others.

"Catalog of Audio-Visual Materials" published by Pat Dowling Pictures, 1056 South Robertson Blvd., Los Angeles 35, California, lists several Nature and conservation films.

"California State Park System Five Year Program" presents a fine picture of a forward-looking program for rounding out the system through June, 1960. It is published by the Division of Beaches and Parks, California Department of Natural Resources, 721 Capitol Avenue, Sacramento, 14, California. Included is a map of the present park system.

Contents Noted

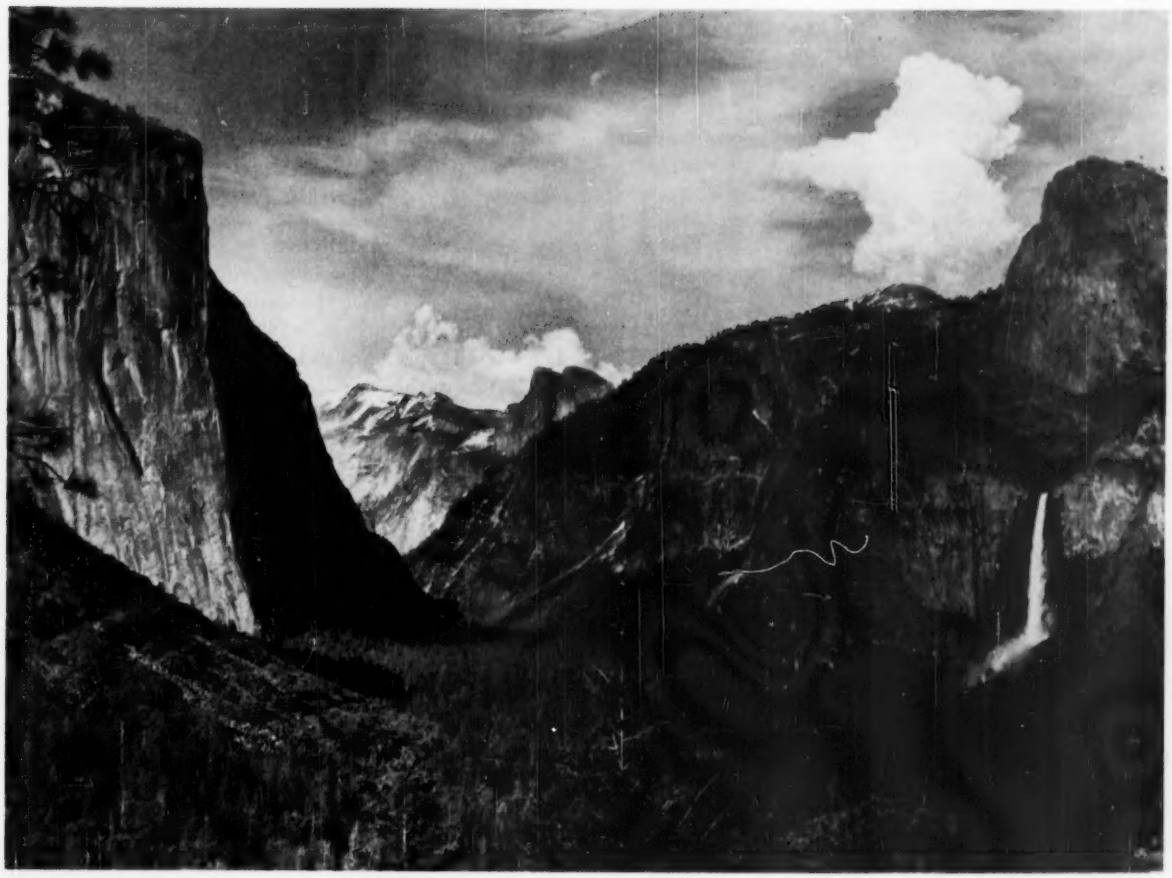
MEETING in Montreal, Canada, the Twentieth North American Wildlife Conference chose as its theme "Natural Resource Use—A Continental Challenge." Three days of technical and general sessions were devoted to papers centering around this theme, and to discussion stimulated by these papers. The entire proceedings of this gathering will be published by the Wildlife Management Institute, annual sponsors of this important conservation conference. These proceedings constitute a volume of several hundred pages, and to attempt to condense the deliberations in brief form is impossible. We shall, therefore, content ourselves here with quotation of some significant facts and ideas presented at the meeting.

FOR the second time in twenty years, Canada was the host to the Conference. Welcoming the more than eight hundred in attendance, the Hon. Jean Lesage, Canadian Minister of Northern Affairs and National Resources, cited the common wildlife and conservation interests of the two countries. He pointed to the Migratory Birds Treaty, signed by the United States and Canada in 1916, observing that "in the modern world it is rather unusual for a treaty to survive unchanged for forty years," which indicated "the spirit of friendly cooperation in which both sides have lived up to it." Canada and the United States, he said, have gone forward simultaneously in the study of bird habits and migration to and from the breeding grounds in the North, and in providing refuges for migratory waterfowl. M. Lesage emphasized that cooperation between the two countries is an example of sound approach to wildlife administration.

CHOOSING as his title "Social Security for Mr. Duck," Ernest Swift, Assistant Director of the U. S. Fish and Wildlife Service, urged greater concern for migratory waterfowl than the solicitude that is in evidence only when the hunting season arrives. He added: "The balance of the year, the greatest predator of all, directly or indirectly, has little or no interest in the welfare of the duck family; complains about restrictive regulations, and turns a deaf ear to the need of fundamental resources management to save waterfowl habitat. . .To make any pronounced headway, we should—through proper channels—project our evangelistic efforts to the halls of Congress, to the State legislatures, to those draining the potholes, sloughs, and marshlands, to the unabashed polluters of waters, and to those who claim depredations." Mr. Swift asserted: "The Fish and Wildlife Service has moral, as well as legal, obligations to two groups of conservationists: (1) Those who are primarily interested in complete protection of all forms of wildlife, and (2) those who, through the purchase of duck stamps, contribute funds for the perpetuation of the resource to provide reasonable opportunities for hunting." Concluding his hard-hitting address, Mr. Swift said, "I wish to point out that it is far better to be condemned for a purpose than for lack of it. Let us hope our purposes are consistently sound and—more important—honest, even though they may be at odds with some of the current advocates of expediency and materialism."

MORE and better research that is thoroughly objective and "performed in an atmosphere conducive to sound research," was advocated by Dr. Clarence Cottam of Brigham Young University. He pointed out that research thus far has accomplished much, but that infinitely more remains to be uncovered. "Our greatest obstacle and handicap," he asserted," is our current inability to sell our wares and to train Mr. and Mrs. John Q. Public and their ever-increasing progeny to be conservation conscious. Our success in research and training will be mediocre, indeed, until the public is made aware of its benefits in helping America to live a more abundant life. The greatest challenge confronting conservation forces is that of improving public relations through an effective program of salesmanship and a demonstration of our good works. Sound wildlife and fishery management can never be a reality until there is first a reasonable semblance of human management."

GENERAL discussion was devoted to the present status and current problems in the fields of resources generally, and in the areas of soil, water, forest and range conservation specifically. One general session was devoted to subjects of basic significance, including population pressures on natural resources, a subject discussed by William Vogt. The papers at this session alone will make the published proceedings worthy of careful reading. The technical sessions brought together those working in the field, doing the research and coming in direct contact with the problems of wildlife management—and human management. These forums covered many subjects of highly specialized character, often over the heads of the layman but nevertheless of basic importance. One special session dealt with conservation education, or information, and the techniques used through radio, television, the schools, and the printed word to carry the conservation story to the public. Thanks to this Conference, and to its sponsors, a large group of working conservationists returned to their work stimulated, yet tired; better informed, even though now and then somewhat bemused; convinced anew that conservation is a vital part of the American way of life, and that it must continue to move forward. R.W.W.



Yosemite Valley as seen from the Tioga Road. On the left is El Capitan, 3604 feet high. Half Dome rises a mile high in the distance and Bridal Veil Falls is on the right.

Tioga Road

By HELEN MITCHEL

Photographs by Frashers

"I HAVE crossed the Range of Light," wrote John Muir in 1869. "Surely the brightest and best of all the Lord hath built; and rejoicing in its glory I gladly, gratefully, hopefully pray that I may see it again."

Pressed for money, but with an irresistible urge to know the Sierra Nevada of California, he undertook the task of grazing sheep. With a shepherd and cook he roamed from below Coulterville to a camp north of Soda Springs in Tuolumne Meadows. This was thirteen years before the surveys were made for Tioga Road.

The lofty Tioga, which makes accessible to the motorist much of Yosemite Park's magnificent back country, had its beginnings in 1881. It was then that a group of eastern capitalists incorporated the Great Sierra Consolidated Silver Mining Company to exploit claims in the Tioga district.

Faced with the necessity of hauling heavy machinery and supplies, the company in 1882 surveyed a road up the Sierra's western slope. Construction started that fall. Chinese labor was employed, and, at a cost of $62,000, the road was finished the next autumn.

The Great Sierra Wagon Road extended from near Carl's Inn, on the Big Oak Flat road, to Tioga, a dis-

This photograph of Yosemite Falls was made in 1861 by the pioneer photographer, Carleton E. Watkins, the first man to record by the wet plate photographic process the wonders of Yosemite. The Watkins photographs were a recent gift to the University of California by Carl Dentzel. A group of these early pictures will be reproduced in the June-July issue of Nature Magazine.

tance of some fifty miles. In December, 1883, and January, 1884, the counties of Mariposa and Tuolumne granted toll franchises, and for a short time tolls were collected from travelers using the road.

Financial disaster closed the mining company in July, 1884, and the property, including the road, was later sold by the Sheriff to W. C. N. Swift of New Bedford, Massachusetts. Mining was resumed for a short time in 1889, but the road, however, fell into disrepair and for many years was used only by sheep and cattlemen.

In 1915 Stephen Mather and a few friends bought and presented Tioga Road to the government. The State of California purchased the portions outside the park, and built the exciting extension down Leevining

where counterpanes of lupine suggest that Chicken Little was right and the sky has indeed fallen. Turning right at Crane Flat, one will be on Tioga Road, and will breeze along until about thirty-five miles from the starting place, then enter what may seem, by comparison, a tunnel. The next twenty miles remain almost as originally built, and the motorist's speed may not average more than 15 miles an hour.

A little experimenting with imagination's "time and space machine" is now in order. Let us suppose it is the summer of 1884. The skinner cracks his whip over his fourteen-mule-team. "Get along you. . ." His language is profane and picturesque. "Got something fancy this trip. Grand piano going over to Lundy." He spits in disgust. "Sure need grand

The Leevening Canyon grade provides the motorists with ten miles of switchback. It was built by the State of California.

Canyon. The Tioga of today, open from about July 1 to October 15, begins at Crane Flat and passes through three of the six life zones, corresponding to transcontinental belts of climate.

If the visitor leaves from Yosemite Valley, he takes the Big Oak flat road. Climbing from the Valley's floor, he may pause at some of the view turnouts, and, in early summer, hear the reverberations of Yosemite's thundering cataracts and see their white plumes. There will be spots where the visitor can look down and watch sunlight work magic with dogwood, and

pianos." Again the whip cracks, wagons groan and rattle, harness creaks and the mules strain up fierce grade after fierce grade. Red dust, rising in clouds, settles to rim eyes, clog throats, blanket men, mules, cargo and trees.

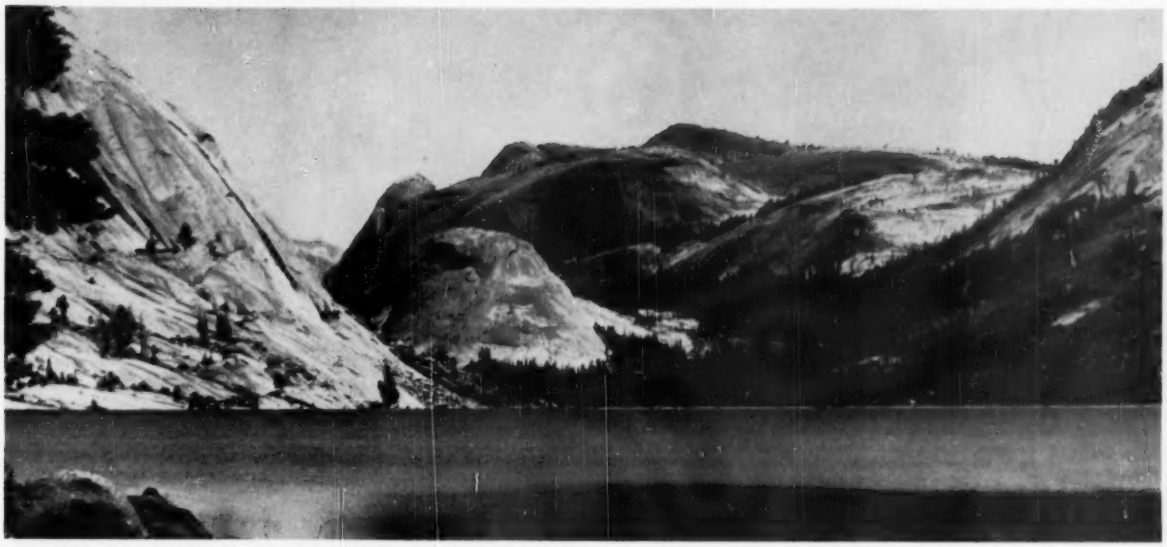
Now imagine it is 1927. Two wayfarers meet on Tioga's dirt road. They wave, smile, and stop to chat.

"Where you from?"

"Los Angeles. And you?"

"Frisco. Wonderful country here."

"Can't be beat. How's she doing? "This refers to



Lake Tenaya lies in a glacier-carved bowl of the Sierra. Poly Dome is left of center. The Tioga Road skirts the lake at the base of the glacier-polished mountain on the extreme left.

the wayfarer's car.

"Fine. Regular mountain goat. But say, some of the folks have to push each other up the grades."

"No kidding? Well, going down's tough on brakes. Better keep her in mesh."

"They got a new wrinkle for Model T's brakes. Quick replacement bands to insert around the transmission drums and fasten with a patent catch. Gets them rolling within an hour."

"What'd you know. Used to take two men all day. Must be making money."

"You said it, brother. Remove the inspection plate, cut the ears from the burnt bands with bolt-cutters, yank out the bands and toss 'em away. Folks are waiting in line at Carl Inn Garage."

"Well, it's nice talking to you. And say, if you stall on a hill be careful putting rocks behind the wheel. Saw a lady get her hand run over. Wonderful country. Good luck." Then San Francisco and Los Angeles chug off, warmed by the greater friendliness of the open road of those earlier days.

Today, it is likely that words, pictures, or maps have not prepared the visitor for Tioga Road. A map cannot really give one a picture of it. Perhaps we may find one motorist, who has been told that this is the shortest route back to Idaho and who has disregarded the warning that trailers are not advised. We may find him stuck a quarter-mile from the crest of a long, corkscrew,

The famous Tuolumne Meadows and the Tuolumne River as seen from the Tioga Road.

The road passes Tioga Lake, northwest of which is the deserted mine that was responsible for the original Great Sierra Wagon Road, the precursor of the Tioga Road of today.

33 percent grade. The road is now oiled and fortunately he has managed to back into a turnout. There he sits in his under-powered car with his overloaded two-wheel trailer. His six children are discovering blood-red snow plants, but his wife is wailing.

"I told you not to come this way. I said we'd never make it. I warned you, John, when we saw that sign. Now what are you going to do?"

The motorist, who at an earlier date would have helped push another adventurer up a hill, passes John. His curious stare says, "What's he doing on this road with a trailer and all those kids? Can't he read?"

But wait. An almost-Samaritan stops to offer advice. "If I were you I'd haul my stuff to the top in the car, come back for the trailer and let the kids walk."

"How much farther is it?" John asks.

"Quite a ways. Lot more grades, too. One out of Tenaya's a pip."

John's wife moans, "We'd better go back."

"That's further," John rightly insists.

The advisor says, "Well, so long Buddy. Wish I could help you," and drives off, never knowing if John got to Idaho by going forward or back.

You may now abandon your time-space machine and resume your own journey. You will pass through areas where the forest presses closely to the road, creating an atmosphere of reverence. You will glimpse ranges of mountains veiled in the blue haze of distance, and you will want to leave your car to walk on cushions of needles and breathe deeply the pine-scented air. You may surprise a Tahoe chipmunk or Sierra golden-mantled squirrel, or, in the distance, hear the hollow call of the Sierra grouse.

Rock-frothed streams will lure you from the car, rewarding you with tiger-liles, monkshood and the ubiquitous monkey-flower. You will explore miniature meadows, magenta with shooting stars. You will have climbed and twisted around and up, crossing Yosemite Creek, which tumbles five miles to the Valley while you have driven more than thirty. Trail signs along the road read: Gin Flat; Smoky Jack Camp Ground; White Wolf; Porcupine Flat; Lukens Lake—which leads into the Grand Canyon of the Tuolumne—, Grant and Ten Lakes Trail.

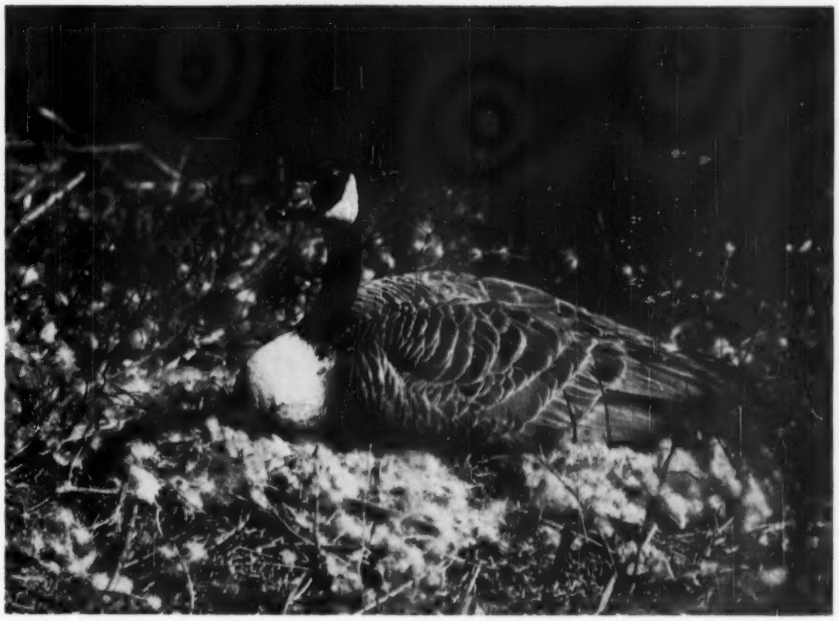
Then Tioga Road will drop you abruptly on one of its sharpest grades to the shores of Tenaya, called by the Indians, Pywiack, Lake of the Shining Rocks. Here you may well feel, as did John Muir, that you could stand for a thousand years. You will have reached this lake, with its indefinable charm, over fifty miles of incomparable scenic road. . .yet will be only ten miles by crow-flight from your starting place.

Tioga now becomes a ledge between the lake and glacier-burnished Poly Dome. In early summer you may have the impression you are driving through the lake and you will be correct, for it sometimes covers the road. However, you will be protected by huge rocks marking the roadside.

You will never forget a night spent at Tenaya. The moon blossoms over a granite dome, provided it is moon-time, and its reflection is a white flower in the tranquil water. Campfires glow and voices send melodies drifting across the lake.

The pine borer at one time killed the forest in this area and occasionally a long-dead tree will crash, briefly shattering the silence. A bear tipping over a garbage can will shatter it with equal efficiency.

From Tenaya's elevation of 8141 feet, the road winds upward and you are soon out of the twenty miles of the original route. (Continued on page 274)



A Canada goose continues to sit on her nest and eggs while the prying photographer records her maternal devotion.

Squaw Creek Refuge

By PERCY L. DePUY

U.S. Fish and Wildlife Service Photographs

VOICES drifted out of the night; haunting voices that penetrated the chill and crept in through my open bedroom window at refuge headquarters. The voices were the babble of wild geese winging their way through the night. It was almost time to get up, but I lay there for several minutes listening.

There is a spine-tingling quality about the cries of wild geese, particularly when one can catch only the sound coming out of the darkness. The birds seem to become disembodied voices, rather than flesh-and-blood creatures.

It is small wonder, therefore, that superstitious miners in the north of England used to shudder when they heard this sound. They said it was the baying of Gabriel's Hounds, imaginary beings that were believed to be the souls of children who had died without receiving the rite of baptism. It was thought that these unfortunates were condemned to wander through space until the Judgment Day. Furthermore, calls of the birds were believed to foretell the approaching death of some member of the community.

To me, the sound was enchanting music; a sign of returning springtime; the epitome of the mystery of migrating birds. I could tell by the volume of the cries that there were not just a few dozen of the geese but hundreds of them. The blue geese and snow geese were pouring back to Squaw Creek National Wildlife Refuge in their annual spring flight. The feathered travelers were seeking the same spot in northwestern Missouri to which they and their ancestors before them had come every March for untold centuries.

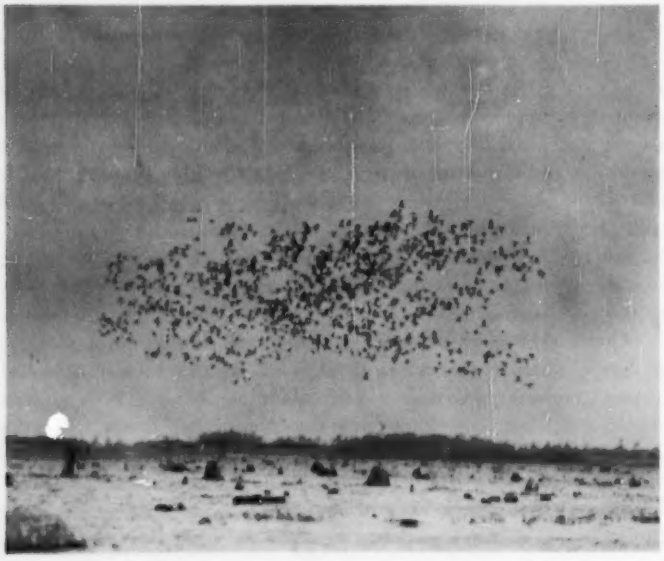
I had received a telegram the day before from a man on the Gulf Coast of Louisiana, reporting that the geese had been leaving their winter quarters there. Now, they were beginning to arrive at Squaw Creek, 800 miles north of the Gulf. They certainly had not wasted time along the way. It is believed that most of them make the trip from southern Louisiana and Texas to northern Missouri in one hop, without stopping for food or rest.

Squaw Creek Refuge is one unit in our system of approximately 270 Federal wildlife refuges. This particular unit was developed primarily for the benefit of migrating waterfowl, especially blue geese and snow geese. However, it is used by a great variety of wild creatures.

The refuge lies in the Missouri River flood plain, forty miles northwest of St. Joseph, Missouri. It is on one of the four principal flyways followed by many kinds of birds during their semi-annual, north-and-south trips across the United States. Food, water and cover are thus available for the birds. It is a place where the avian travelers can come down from the sky to feed and rest in comparative peace. It is, indeed, a "refueling base for feathered hydroplanes." During the migrations each fall and spring, the 7000 acres of the refuge resound to a medley of whistles,

Hundreds of thousands of blue geese and snow geese winter on the Gulf coasts of Louisiana and eastern Texas.

Snow geese take off from their feeding, and (below) blue and snow geese on the wing.



quacks, honks and squawks from the throats of thousands of aquatic migrants.

The arrival of the geese is one of the big events of the year at the refuge. Their coming has never failed to thrill me. As soon as it was light enough to see well, armed with binoculars, I went to a spot part way up the high bluffs that rim the flood plain. From here a broad vista of drab, weathered marsh vegetation, brown thickets and muddy lakes lay spread out before me. A fresh breeze bore the odor of damp earth from the swamps; a bright spot marked the point where the sun would soon be peeping over the bluffs. The sky seemed to be alive with geese. I must have seen 2500 of them the first minute I was there.

The huge, noisy flocks were sweeping into view, high above the crest of the bluffs. They resembled strings of tiny, blue-gray beads, with a few white beads scattered here and there through each strand. Blue geese and snow geese are closely related species, and those that migrate northward up the Mississippi Valley usually travel together in mixed flocks. On that morning the flocks were ninety to ninety-five percent blue geese. They were flying in V-shaped strings, in double Vs, and some even in strings. The sun was already shining up where they were, and its rays on their rhythymically beating wings made the beads seem to twinkle.

When each group arrived above the lakes, its members could see and hear the geese already down on the water. The newcomers would circle around as though looking for a place to land, then came raining down out of the sky in "falling-leaf" dives. They sideslipped, first to one side and then the other, zigzagging downward and losing altitude rapidly. They suggested dead leaves tossed by forkfuls into the air and allowed to flutter to the ground. This landing maneuver produces a striking effect when performed by numbers of creatures as large as wild geese.

The birds continued to arrive throughout the entire day. There was probably not one moment between dawn and dusk when there were not at least five hundred of them in the sky; often five times that number were visible at one time without the aid of binoculars. After nightfall they could still be heard arriving, and no fewer than 40,000 blue geese and 2500 snow geese were on our lakes and mudflats when the sun arose on the morning of March tenth.

The winter had been mild and about 40,000 mallard ducks had remained on the area. They had been joined, during the last week of February, by 10,000 pintail ducks that had

already started their northward flight.

However, bird activity at Squaw Creek Refuge really got into high gear with the coming of the blue geese and the snow geese. Almost every day after that, we saw species that we had not seen since the fall before. Among those welcomed were flocks of Canada geese, a few white-fronted geese, and many species of ducks, including more thousands of mallards from the South. Chattering swarms of blackbirds swept in undulating flight across the swamps. Great blue herons stood motionless in shallow water, waiting for fish to come along. There were song birds, sandpipers, gulls, birds of prey, and great white pelicans. By the last week of March, the avian population of Squaw Creek Refuge, and its immediate vicinity, numbered in the hundreds of thousands.

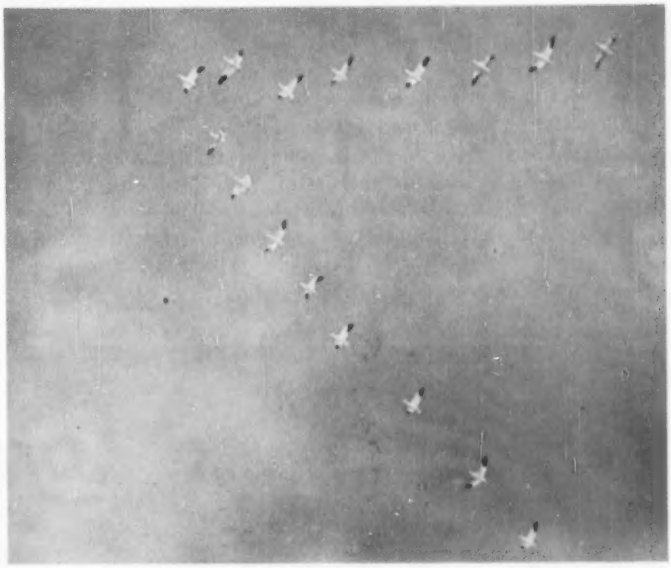
Some came to spend the summer and rear families on the refuge; some enjoyed Squaw Creek's hospitality for two or three weeks; others paused for an hour or two to feed and rest before speeding on their way again. Finally, there were the year-around residents that did not leave the vicinity of the refuge at any season.

The refuge is a rather complete biological community in itself. Every day, its inhabitants go about the serious business of living. The place is like a bustling airport city through which stream travelers from many lands, but which also has its permanent residents.

Most of the blue and snow geese loafed around the refuge for a week or ten days before pushing on toward their ultimate goal in the North. They would fly out to the fields of tender young wheat on surrounding farms to feed. Sometimes, ten thousand birds would alight on a twenty-acre field and, for an hour, transform its color from green to blue-gray speckled with white. Then they would lift like a cloud, with a mighty thunder of beating wings and squawking, leaving the field almost as green as it was before they came. However, they made the refuge their headquarters, and the broad mudflats bordering some of our lakes were their favorite loafing places.

After enjoying Squaw Creek hospitality for a few days, the blues and snows started taking off on the next leg of their journey. The summers are short where these birds nest, and the mated pairs do not have much time to loiter along the way if they are to reach the nesting grounds early enough to raise families, shed their old suits and grow new ones in time to start south before the autumn storms set in. Every day, swarms of the great birds would

Snow geese on the water and on the wing at a feeding area.



Lesser snow geese from the Arctic, flying in a V, and (below) blue and snow geese, and one Canada.

rise from the mudflats amid a tumult of roaring wings and raucous squawking. They would arrange themselves in long skeins and start winging toward the next resting place along their northward route.

Finally, there were only about 200 blues and fifteen snows left on the refuge; probably all bachelors. They were a carefree lot. There was no compelling reason yet why they should hasten to the nesting grounds.

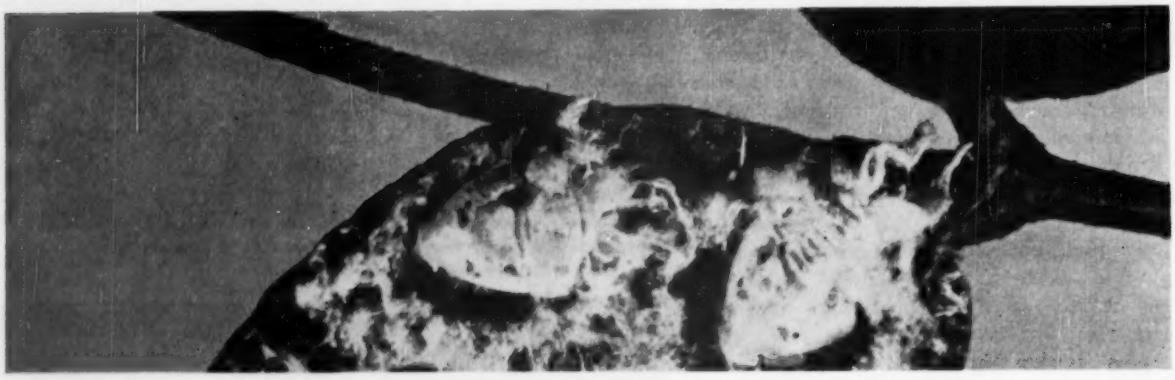
At last, May arrived. The willows were decked out in the pale green of spring. On the marshes, fresh shoots were pushing up through the tattered remains of last year's vegetation. The days would soon be warm, the mud on the flats would become dry and cracked, and the wheat plants would be coarse and unpalatable. Squaw Creek Refuge is no summer resort for wild geese. An age-old behavior pattern was drawing the bachelors toward the cool damp tundra beside the Arctic sea where the vegetation would be young and tender, and one sunny morning, about the middle of May, these footloose geese took off.

Most of the ducks had now gone north and the refuge was taken over by the nesting song birds, by turtles and clouds of hungry mosquitoes. The vanguard of the south-bound migrants would arrive at

Panoramic view of Squaw Creek Refuge, host to many waterfowl in migration.

Squaw Creek in late August or early September. By the time October's frosty nights had stripped the willow thickets of their leaves and turned the marsh plants brown again, Squaw Creek Refuge would once more be a busy and a noisy airport. Once more, there would be voices in the night.

★



The Lightning Leafhopper

By GEORGE A. SMITH

THE lightning leafhopper belongs to an odd group of insects known as lantern flies. It is frequently found on viburnum bushes and other types of garden shrubbery. The name of lantern fly seems to have come from the erroneous belief that some species of this insect had heads that glowed in darkness, especially certain species.

The lightning leafhopper lays its eggs in the fall of the year in the slits of twigs and covers them with a white, waxy secretion. When the nymphs hatch in the summer of the following year they are concealed under a blanket of white, flocculent strands of material. The adult insect, about one-fourth of an inch long, with purple or brownish wings, is very active, as its common name suggests. When full grown it will leap out from under its downy covering in an amusing manner at the mere approach of a pointed finger. In its lightning speed to jump away it loses most of its white fluffy covering. There are many species of insects that are given the popular name of Leafhopper.

This is a photomicrograph of a water springtail, *Podura aquatica,* magnified several hundred times. The dark spot on the side of the head contains eight eyes. The springing organ is here shown extending behind the insect in the position that it temporarily occupies after each leap.

Seeking the Secrets of the Water Springtail

By RICHARD STUART PHILLIPS

Photographs by the Author

THIS is the story of a quest that spanned thirteen years of my life. It started in my twelfth year and finally reached fulfillment in my twenty-fifth. We may think of a quest as involving long-buried treasure, a lost diamond mine, or some priceless object stolen ages ago and hidden away in some ancient garret. My quest was merely an attempt to discover a few facts concerning the life history, habits, and internal anatomy of a minute insect.

In the summer of my twelfth year I discovered, in the public library, a copy of Needham's *Fresh-water Biology*. The stupendous variety of forms pictured and described there sent me off on a collecting spree that lasted throughout the entire vacation. Every day, much to the amusement of my neighbors, I made a foray into the country armed with a three gallon scrub-bucket, half a dozen pickle jars in a knapsack, a collecting net, and a formidable array of sieves, strainers, and dredging tools. I always returned with a variety of frogs, toads, salamanders, turtles, insects and their larvae, clams, fresh-water fleas, and anything else that I could strain from the mud.

It was on one of these excursions that I first encountered the insect the identity and habits of which were to plague me for so many years. I had bent down to examine a shiny black spot on the moist side of a rock that bordered a stream. Right before my eyes the tiny ebony patch began to grow dim and within a few seconds disappeared! Shortly afterwards, I discovered another of these spots, clapped an open fruit jar over it, and waited to see what would happen. Once again the dark stain on the rock vanished as if by magic. Astounded, I peered into the jar and found its walls dotted with several hundred tiny creatures that appeared and disappeared.

Thoroughly puzzled, I went straight to the high school science teacher with my container of mysterious beings. He could not identify them. The biology professor at a nearby college was unable to tell me what they were, and emphasized that he was a botanist. My Scoutmaster was equally at sea, so I sat down with Needham's book and went through it page by page. Finally I came to the description of an insect called a springtail, that seemed to match the characteristics of the appearing-disappearing animals in the jar. These springtails, according to the text, had a spring-like appendage beneath the abdomen. When released, this would catapult them into the air to a height of several inches. But they were so minute, only about a thirty-second of an inch in length, that I could not see the spring, so was not sure of a positive identification. However, as a Christmas gift that year, I received a beautiful, shiny, brass microscope that magnified all of seventy diameters and focused by sliding the draw tube up or down by hand. With this instrument the spring was plainly seen.

I now knew the name of these tiny leaping insects — water springtails—but my curiosity was not yet satisfied. I wanted to know more about them—what they ate, where they spent the winter, even what they were like inside. But all of the books that I could find said only that springtails are simple, primitive insects that breathe through their skins and are of wide distribution. This was both inadequate and a challenge.

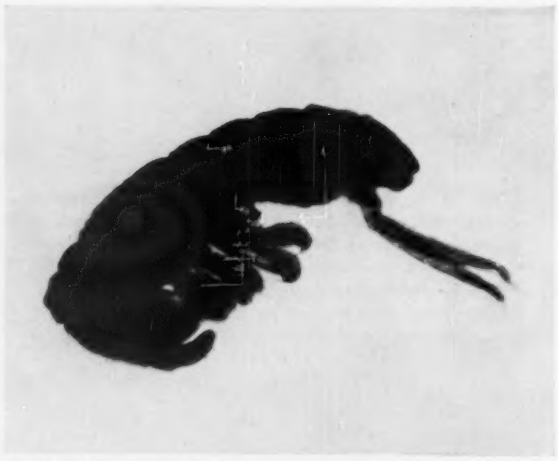
Throughout my years in high school, and during five years of college, I sought, when possible, information concerning these insects, but in my quest had not accumulated enough information to fill one side of a sheet of typing paper, double-spaced. So it was only natural that I chose the internal anatomy of the springtail as my subject for graduate research. The members of my family, my friends, and my instructors were amazed. I am afraid that many of them doubted my sanity when I showed them a test tube containing some springtails that they were unable to see, even through their spectacles.

After two years of peering at living, leaping springtails, sectioning preserved specimens from head to tail and from side to side, staining with light green, safranin, eosin and other dyes, I had accumulating sixteen pages of facts concerning the insect. I showed a copy of the notes to my advisor. He was glum and noncommittal. I took the data to the head of the department. He was dubious, but he agreed to submit my paper to the

This is a longitudinal section through the body of a water springtail. The thin dark tube at the left of the picture is the esophagus, leading from the mouth back into the stomach. The larger darker tube that is outlined in the middle of the photograph is the stomach or midgut.

faculty committee. Then one stifling July afternoon, while I sat, bathed in perspiration, on a hard bench in the hall, those august gentlemen debated the merits of the paper, quaffing iced tea and lemonade. After a period of time only slightly less than an eon had passed, I was invited in and told that they were a bit dubious about the scientific value of the work, but that they had decided to give me my degree anyway. I left the room in a smouldering, blue rage. Scientific value or not, those sixteen pages, clamped beneath my arm, had ended a long search and finally satisfied a curiosity that had endured for thirteen years.

Springtails, I had found, are tiny, simple insects, only a few of them being more than two millimeters in length. With their relatives, the members of the Thysanura, they are among the most primitive representatives of the class Insecta. They may be the connecting link between the myriapods, or many-legged worms,

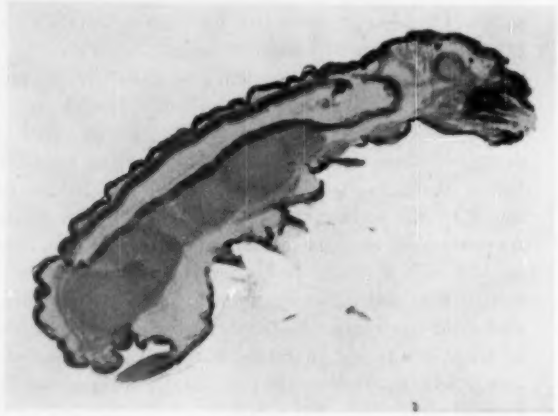


This photograph of a springtail illustrates the Y-shaped leaping organ that is attached to the fourth abdominal segment.

and the higher insects. Certainly they are much like the first insects to appear upon the earth.

The exact number of species of these insects is not known, but there are at least seven hundred of them, of which one hundred fifty occur quite commonly in the central part of the United States. They are of wide distribution, being represented in almost every corner of the earth by a few species. One variety, *Sminthurus hortensis*, occurs in Europe, North America, Tierra del Fuego, and Japan.

The springtails inhabit a variety of situations and feed upon decaying plant and animal matter. They



At the right of this photograph of a longitudinal section through a springtail is the cavity containing the chewing mouthparts. Just above and behind the mouthparts is the globular ganglion that serves the insect as a brain. The dark tube running nearly the length of the springtail is the stomach. Leading to the left of the stomach and down is the hind intestine or rectum. Beneath the stomach are the lobes of the ovary containing many thousands of eggs. The testes are approximately the same size and shape as the ovaries and occupy the same position.

are found on the surface of ponds and streams, under stones, in decaying leaves and wood, in the chinks and crevices of bark, on growing garden plants, in moss, in manure piles, in hotbeds and windowboxes, in cellars, and in humus. One of the more common species, the snow flea, *Achorutes nivicola*, is often seen in winter hopping about on the surface of the snow, and in early spring it makes a nuisance of itself in maple sugar camps by getting into the buckets of sap.

Podura aquatica, the species that puzzled me for so long, averages 1.3 millimeters in length, has eight eyes on each side of its head, and lives along the margins of ponds and streams. Sometimes it is found floating on the surface, sometimes clinging to the sides of moist rocks, and, on chilly days, hiding beneath dead leaves that have washed ashore. It is gregarious, being found in groups of a dozen to a thousand individuals. Its food consists of algae and decaying leaves. The water springtails are most numerous during October and November, but may be found at almost any time. Even in the winter months a little searching under rocks, leaves, and scraps of wood or bark that lie within a foot of the water will disclose numbers of these tiny insects clustered together in their winter sleep.

These primitive insects resemble a fat ant with a dull, bluish-black, plainly segmented body and short, reddish-brown legs and antennae. None of these insects possesses wings. There is no metamorphosis, the young resembling the adults in every respect except their smaller size and lighter coloration. The immature individuals are reddish-brown, the color deepening with each instar until the blue-black of the adult stage is reached. The exact number of molts that they pass through is unknown; but some extremely small specimens that I collected and kept isolated in test tubes molted twenty-three times before becoming adults.

The members of the Collembola, the order of insects to which the springtails belong, possess two distinctive organs that set them apart from other insects. On the first abdominal segment they bear a collophore or ventral tube, which secretes a viscid fluid that enables them to cling to the underside of objects. On the fourth abdominal segment is a peculiar Y-shaped, spring-like appendage, the furcula, which is carried bent forward against the ventral surface when the insect is at rest and is retained in that position by two tiny clips on the third segment! The normal method of locomotion in the water springtail is a slow, laborious crawl, but when alarmed the animal releases this spring, which, striking the surface of the water, or any object upon which the springtail is resting, catapults it into the air to a height of a foot or more. The furcula is undoubtedly derived from the abdominal appendages of the myriapod ancestors of this insect.

This is a cross-section through the abdomen of *Podura aquatica;* the dark area in the center of the body is the stomach. The two areas beside it, one on either side, are the ovaries.

Because of their primitive condition, we find the components of the anatomy of the springtails reduced to a minimum. There is a dearth of the accessory organs that the higher insects possess. Essentially, *Podura aquatica* consists of a crude digestive tract and a set of reproductive organs. Spiracles and tracheae are entirely lacking. Respiration is carried on directly through the skin where it is exposed between the plates of the exoskeleton. This diffusion of gases can occur only through a moist membrane; this accounts for the members of the Collembola being found exclusively in damp situations. There are no Malphigian tubes, these roughly correspond to the kidneys of higher animals. Protein wastes are accumulated in the fat body and remain there until death. The chewing mouthparts of this species are overgrown by cheek-like processes, giving them the appearance of being withdrawn into a cavity.

These few hundred words of explanation and the photographs illustrating the anatomy of the water springtail represent the end of the quest. It has not been as rewarding from the standpoint of thrills and financial return as might be a search for buried treasure along the Spanish Main, but it has furnished excitement aplenty and enough blind alleys and devious turnings to satisfy the most confirmed seeker after truths.

Mother's Day

By LOUISE MAYERS MEREDITH

If red, the flower you wear today
Should lift her heart, the gentle way;
If white, you wish more than another
To talk with one who knew your mother.

A Swainson's Warbler in the nest in the canebrake of Ocmulgee Swamp. With few exceptions, this bird is found only in the canebrake habitat of the coastal plain river bottoms of southeastern United States. (Below) Nest and eggs of this warbler. Three or four milk-white eggs are laid in May. The nest was composed of cane, gum, hornbeam and other leaves, and was lined with cypress needles.

A Warbler of

By BROOKE MEANLEY,
with ROMEO MANSUETI

RETURNING home after a day of birding in the Ocmulgee river-bottom region of central Georgia on a pleasant day in March, I felt satisfied after seeing so many new spring arrivals. Working through the lush understory was not the most pleasant experience, for the whole area had been flooded with heavy rains. But not many bird enthusiasts could report such interesting birds as Lincoln's and Bachman's sparrows, rusty blackbirds, palm and yellow-throated warblers, and the red-cockaded woodpecker, all of which I observed that day.

Suddenly, a series of loud, clear whistles pealed forth only a stone's throw from me. "Hmm," I thought, "The first Louisiana water-thrush this spring." I continued on my way.

As I was leaving the canebrake, I recalled William Brewster's list of the four ecological characteristics required by the Swainson's warbler, *Limnothlypis swainsonii*. The canebrake, stagnant ponds, semi-aquatic vegetation, and lush undergrowth that he specified were all present.

Retracing my steps. I heard the song once again. There was a slight variance in the Louisiana water-thrush-like voice. The notes seemed shorter; the opening *tschip* slurred. Two lower notes and a higher one followed. Turning toward the source of the sound, I saw, within twenty feet, a small, olive-yellow bird with a characteristic white line above the eye. Here was a new bird to me—Swainson's warbler!

As I approached it, the bird continued its busy movements on the ground. While I crawled to within three feet of it, the warbler fearlessly went on searching for choice morsels among the debris cast up along the water's edge in the canebrake.

The bird allowed me to follow it around the swamp floor, barely paying any attention to me. In all my encounters with birds, none has impressed me with the lack of fear of this diminutive individual. Has its infrequent contact with man given this bird an unusual sense of security?

As I followed the warbler's antics, I was struck by its brown crown, conspicuous white stripe, and generally drab attire. All of a sudden it stopped and cocked its head skyward—then it sang a singularly melodious song, stopped to resume feeding; then sang again for a few seconds; stopped once more and continued its feeding. Soon I realized that darkness had overtaken me. Swainson's warbler and I had been together for a full hour.

the Canebrake

Photographs by
Brooke Meanley

Swainson's warbler, I later learned from experience, is rated a rare species over much of its range because of its reserved habits. East of the Alleghenies, it is generally observed from central Florida to southern Delaware. It is an inhabitant of the coastal plain river bottoms and swamps of the southeastern United States, but it has been recorded breeding in rhododendron thickets in the mountains of West Virginia. During migration it has been observed at an altitude of 2000 to 3000 feet in Kentucky and Tennessee. During the spring of 1948, I discovered one singing lustily in the vicinity of its nesting ground at its northernmost station along the Atlantic seaboard in the Pocomoke Swamp in Sussex County, Delaware. Unlike its typical southern habitat, here it is found in pepperbush swamps.

During the last week of April in Georgia I watched a male Swainson's court the female in a territory of perhaps fifty square yards. It was not a spectacular courtship, and the birds did not make the interesting display as with many other species. But they seemed closely attached to one another. The female did not lead the male on the merry chase common with many other birds.

I found about ten nests, most of which were about five feet above the ground, and placed on canebrake stalks. The nest, which resembles and is a little larger than that of the cardinal, is made up of cane and gum tree leaves. It is lined with stems of red maple fruits, or cypress leaves from its immediate habitat.

In order to seek out the Swainson's nest one may have to crawl around the underbrush of cane and greenbrier on hands and knees. Complicating the situation are the bunches of dead leaves and debris on cane stalks that superficially resemble the nests. But, despite all of Nature's camouflage, the nests are easily found when one is near them. When the warbler is aware of the intruder it may often flit butterfly-like to the ground, or *tschip* in annoyance.

When I discovered the first occupied nest, I touched the bird before it flew off. As it fluttered to the ground, protesting, I observed three milk-white eggs about the size of a song sparrow's. Whether the individual on the nest was a male or female puzzled me, since the sexes are indistinguishable. In some species of warblers both male and female incubate and brood their offspring. At times I have seen one Swainson's on the nest, while another, the male, was singing nearby.

One day I saw both adults feeding the newly-hatched

Trying to spot a Swainson's warbler along the Ocmulgee River, Brooke Meanley adjusts his binoculars before a background of palmettos, Spanish moss and gum trees. (Below) The haunts of the warbler are characterized by lush growths of canebrake. This is also a region of canebrake rattlesnakes, bobcats, varied birds, including other species of rare warblers. However, the bird has also been found in the mountains of Kentucky and West Virginia.

The lush forest along the Ocmulgee River in Georgia is almost as impenetrable as it appears. Dweller of such an area, Swainson's warbler has led such an undisturbed life that it is utterly unafraid of man.

young. One was brooding the youngsters while the other flew off for food. As soon as the latter returned, the other would depart, allowing its mate to feed the fledglings. After feeding them the parent settled down in the nest to brood them until the other bird's return. This alternation occurred three or four times. Presumably, it can be stated that both sexes of Swainson's warbler brood their young.

While photographing the female, no difficulty was experienced in bringing the camera close to the nest. In one instance I was able to pick the bird off the nest without the usual mild squawking and fluttering.

Upon arriving at one nest that I had been photographing, a canebrake rattlesnake was discovered lying perfectly still about ten feet away. As the snake was approached, its staccato rattling startled me, but the bird merely moved its head slightly. On another photographing trip, I happened to turn around, and saw a handsome bobcat watching me intently from a distance of about sixty feet. As I started toward it, the cat loped off. That rattlesnake and bobcat, both swift and deadly hunters, must take toll of the fearless, ground-living warblers did not seem a remote possibility.

Flash floods probably present a real hazard to the brooding birds. On one occasion I visited a nest in a canebrake during a clear, sunny day after a rain. The area was relatively dry as I made my routine notes and readied my camera. Nearby I noticed that the stream seemed to swell. Soon the water had risen to my knees, and I decided to leave. As I made my way toward the logging road that lead out of the bottomland, the water reached my shoulders.

Later I came back to find that this particular nest, constructed on a leaning cane stalk, had not been swamped. That the water had risen above the height of the nest was evidenced by floating leaves and debris lodged in the surrounding cane as the water receded. Apparently this nest had floated conveniently with the rise and fall of water.

When one watches Swainson's warbler he notes that the feeding movements along the ground are sometimes erratic. As it walks about rapidly, covering little ground, the posterior part of its body occasionally trembles and often jerks about as if the bird were chilled. Small ground beetles and their larvae, caterpillars and moths, seem to be the staple diet. Occasionally the bird will dart with amazing alacrity into a bush to pick off an unlucky moth. Others thrust their beak unhesitatingly beneath leaves and twigs in search of insect prey.

Although predominantly a lover of the ground, from which it often sings, the bird frequently takes to the lower branches of trees (Continued on page 276)

The author, his wife and "The Vikings" ready for a berrying expedition, with all the by-products of Nature excitement that goes with such a trip outdoors.

All This . . . And Shortcake, Too!

By CARSTEN AHRENS

BLACK-CAPS, blue berries, huckleberries, blackberries, elderberries, dew berries, wild strawberries, cranberries—the world is abundantly blessed with these delicious fruits. And my family and I do not believe in letting them go to waste. The blackbirds and purple grackles complain a bit when we harvest the black-caps, but we have never decided whether they dislike berry pickers or just people in general. We leave plenty of berries for them. We eat our fill and put aside jars and jars of jams and jellies, or frozen fruit, to brighten up the gloomy winter days ahead.

Our neighbors, summer folks who have "estates" in our lake country, are mystified with our berry-gathering habits. Senor A., in the Spanish castle to the east, has rows and rows of Boysenberries that produce such enormous fruit that a half-dozen, or so, berries will fill a pint basket. Mr. S., in the prairie-sized ranch house to the south, grows a lush and lavender raspberry, which bears in July and again in late autumn. Both are at a loss to know why anyone should go to the meadow, the woods, line fence, sandbar, or bog for berries when one's "man" can pick as many as one wishes in no time at all.

God must have loved wild berries because, like the poor, he made so many of them. When I was a boy, mother and I picked quarts of them in the same spots where my four vikings and I pick now. Mom and I would pick at sun-up, when the dew made fabulous necklaces of spider webs. Mom loved to get out after berries any time, but, in her schedule, berrying was extra-curricular and had to be done before the work-a-day world would become active. So we would get up very early so that she could get back in time to prepare a farm breakfast for our big family and the numerous hired hands.

Back then, farmers in our parts had zigzagging old rail fences that ran riot with wild roses and wild berries. Mom would take one side and I would pick on the other. Today, the land-monopolizing rail fences are gone, but modern farmers are encouraging fences to go wild. A few years back the farmer was considered a careless one if his fences were overgrown. All undergrowth was grubbed out, and the berry canes went, too. Now, happily, it is considered good wildlife management and conservation to provide adequate cover for small animals, nesting sites for birds—and berries for shortcake eaters!

Berrying beats other outdoor activities in at least one way; there is no such thing as "berryman's luck."

I have gone to the same places in search of the wild fruit since boyhood and have never been disappointed. I have been fishing without the thrill of a single strike. When berrying, one always gets at least "enough for breakfast."

Berrying is a little like swimming, one of my favorite hobbies. Experts declare swimming is an excellent sport because muscles are activated that are unused in most other forms of exercise. Securing wild berries, especially a big black-cap, away in the very center of the thicket, one twists, turns, stretches, so that every muscle of the body is brought into play.

I am not going to imply that berry-picking is entirely placid. The fruit grow best where a disturbance has recently occurred, where a forest fire has raged, or a county ditch has been dug. Berry canes rush in to fill the gap and successfully hide stumps, fallen logs, and groundhog holes. Many of the canes are armed with prodigious thorns that hook on if your clothing permits. The wise berry-picker wears some hardy garment made from denim or other tough cloth.

There are other minor annoyances. Daddy-long-legs always seem to live among berries, and some pickers are annoyed when this eight-legged stilt-walker wavers over his hair, ears, and elsewhere. Then there are those deep-green insects that the farm boys inelegantly call "stink-bugs." If you have ever popped a handful of luscious berries into your mouth, and a stink-bug inadvertently went along, you will remember the taste for a long time. Little unpleasantnesses like mosquitoes, blackflies, deerflies, and stableflies are occasionally disturbing. Keep well denimed up. A denim jacket that can button snugly at the wrists and throat is an ever-present help. We dust a bit of sulfur in our socks, around our wrists and neck and keep free of chiggers. Snakes have never bothered us.

There are so many wonderful things to enjoy while berrying. There is the intricate web of the black and yellow Argiope spider; the tireless flight of dragonflies; the egg-laying activities of ichneumon flies and lacewing flies; the discovery of an emerging luna moth; the cautious observance of a hornet's gray nest; the green clusters of hazelnuts; the green or crimson enameled fruit of the jack-in-the-pulpit; the song of the hermit thrush or the wood peewee; sea gulls crying in the wind; the serenity of a soaring hawk; the loom-like grace of a waterfall; the odor of drying alfalfa hay.

And while we are picking, we play endless word games, or someone tells a Hans Christian Anderson tale, or we harmonize with camp songs or hymns.

What fun we have! God made families, so it must be one of the best groupings for human society. Families should work together and play together. So far we have enjoyed doing things as a unit. Sometimes aunts or uncles, cousins and friends, join us, but usually we perk along under our own steam. We look forward all year to "daddy's vacation" when we can all be together, play together, pick berries together.

After one Nature-filled afternoon that included a fight between an eagle and a fish hawk, a turtle burying its eggs, the first time they had seen redstarts, and buckets of berries, one of the vikings rapturously declared, "Just think, all this. . .and shortcake too!"

Dispute Glimpsed in a Northern Marsh

By DOROTHY COBLE DREESE

OFTEN in traveling we may catch a glimpse of some unexplainable action of bird or animal, but are unable to stop to investigate what is happening. Such is an incident I saw and will ever wonder what was the cause and the result.

Moving at a brisk pace along a winding Vermont highway, we passed a small marsh. From above a red-winged blackbird dived, battling an American bittern. There was no time to discover the cause of the argument, whether the bittern was receiving just punishment, or whether the red-wing was out merely to annoy the bittern.

The blackbird was in brilliant spring plumage; glossy black with red-yellow epaulets on extended wings. As it leveled off, in upward tilt of wings, over the head of the angry bittern, it uttered a harsh," Oka. . . .l. . .e. . . .e. . . .e. . .e." The bittern, neck-high in pickerel weed, upthrust its sharp open bill. With eyes glaring, focused on the red-wing, it waited in ready defense for the next attack. This was the exciting and indelible picture that I took with me.

Cats, Domestic and Wild

By E. LAURENCE PALMER

Illustrated by Carolyn Powers, Hope Sawyer, Louis Fuertes, and Ed. Reilly, Jr.

This is the eighty-first in NATURE MAGAZINE'S *series of educational inserts.*

ABYSSINIAN CAT

RUSSIAN BLUE CAT

DID YOU ever succeed in putting a strange cat unexpectedly into a bag? If so, you can appreciate the smug expression of success that can be seen on the face of anyone who boasts that "it's in the bag." It may surprise you how many other common expressions we have that are based on our acquaintance with cats, and the abundance of these expressions is ample evidence that we usually have a broad experience with these animals. Let us look at a few of these expressions just to illustrate my point.

A tough customer in a fight of any sort is frequently referred to as being able to "lick his weight in wild cats." One who just will not be downed by what would seem to be fatal experiences is "like a cat with nine lives." If one is not impressed by superior rank, he may say, "A cat may look at a king." When unsupervised work ceases, we say, "When the cat's away, the mice will play." When someone gives a secret away, he "lets the cat out of the bag," and when one finds himself involved in a difficult situation from which he cannot easily free himself he has "the tiger by the tail and dare not let go." Can you think of any better way to describe guilt than to refer to looking like the "cat that swallowed the canary?"

If you stop to think about it you will recognize some significance in dual meanings to the names of different parts of a cat. The spike of a cattail surely looks like a cat's tail. We refer to a dupe or a tool as a "cat's paw." When people "show their claws," or "arch their backs," "snarl," make "catty remarks," or "pussyfoot," we know what is meant without further explanation. The gem-like stone, "cat's-eye," certainly is well named.

BURMESE CAT

DOMESTIC SHORT-HAIRED CAT

CHINCHILLA CAT

TORTOISE-SHELL CAT

SIAMESE CAT

MANX CAT

MAINE COON CAT

PERSIAN CAT

PEKE-FACED PERSIAN CAT

ANGORA CAT

In the early days of radio crystal sets, I once knew a boy who cut off his cat's whiskers to get a "cat whisker" to complete his outfit. It is not so easy to recognize reason in the term the "cat's miaow," but that is no worse than much of the modern slang. Even the "smile on the face of the tiger" has been used to describe smug satisfaction more aptly than many references. To change the subject a bit, we merely say that "that is another breed of cats."

Folk lore, history, and superstition, all have been enriched by references to cats. "Puss in Boots," the "Owl and the Pussy Cat," Dick Whittington's cat, Kipling's "Cat that Walked by Itself," are deeply rooted in our lore. A recent widely quoted cat reference is "I thought I saw a putty cat."

Superstition about bad luck and black cats, and good luck and white cats, we are now inclined to laugh off as ridiculous, but there have been times when the reputed alliance between cats and witches, bats, the Devil, owls and darkness, could not be laughed off so lightly. This was particularly true in Europe in the 9th Century. It was not long ago when, for good luck, it was the practice in Flanders to throw cats from the towers of the town on the second Wednesday of Lent, and in Picardy a cat was burned regularly on the first Sunday of Lent. In England, there was a time when it was the practice to roast cats alive in cages before fires, while neighboring Scotland went further and roasted them alive on spits in front of a "slow fire." These evil times came between today, when cats have plenty of champions, and ancient times in Egypt, when cats were revered, and when a cat Goddess was recognized. The once mighty city of Bubastes was erected and dedicated to the worship of cats, and 700,000 persons came there in one year to pay their respects to these animals.

While cats are not mentioned in *The Bible*, they have probably been domesticated in Egypt as far back as 1300 B.C., and heiroglyphic representations of cats go back to 2400 B.C. It has been suggested that, since cats may first have been domesticated in the Land of Cush, the name puss carries down through the ages from the name Cush. Others claim that this is more recent and refers to the cat-headed Egyptian Goddess known as Bast, Pasht or Pasche. Strange to say, in all this history we find no reference to the Russians having invented cats, but this may come to light sometime. We do have a breed of cats known as Russian Blues, but they are much less known and significant than the Russian Reds, of whom we hear so much in the newspaper today.

Possibly we might say that all of us are divided into three groups; those who admire cats, those who despise them, and those who are indifferent to them. It is not difficult for me to assign myself to one of these categories, but I hope that you will not detect which one this is from reading this insert. Swinburne wrote of a cat: "Stately, kindly, lordly friend, condescend here to sit by me." An old Hebrew proverb tells us "When the weasel and the cat marry, it bodes evil." Pope spoke of the idiosyncrasies of some people when he said: "But thousands die, without this or that. Die, and endow a college, or a cat." It seems difficult to understand how some who die leave abundant funds to provide for the care of cats, and at the same time leave nothing to help unfortunate mankind. Shakespeare plays safe in "The Merchant of Venice" when he refers to "a harmless necessary cat." In the same play, he also refers to some men who "are mad if they behold a cat."

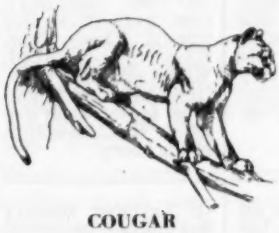
There is no doubt that some modern humans show concern over the misfortunes of many a cat. Think of the fire companies that are called out to rescue some fool cat that has climbed to the top of a telephone pole and refuses to come down, or the amount of labor that has been spent by men to dig up a drain pipe into which some stray cat has gone for refuge, or for some other reason. No, public opinion is such that, whether we like cats or not, they will on the whole get a fair deal in these modern times. The humane societies and the anti-vivisectionists may differ in reasonableness, but their influence on public opinion commands the respect of a substantial following, whether or not this is always based on reason.

I have lived in a college town for nearly a half-century. The first zoologist on the Cornell faculty was a Civil War surgeon. He believed in the study of anatomy, and the standard animal used in teaching anatomy was the domestic cat. The college treasury was poor, and the student body was even poorer in the early days. When in his nineties, Simon Henry Gage once reminisced on his early college experiences. He told of the raids made by the student body on Ithaca's cat population to supply laboratory material and a little cash for the students. Sometimes this proved embarrassing, as when the favored pet of an eminent university official vanished under suspicious circumstances. An investigation was started, but by the time it reached the danger point all the cats in the zoology laboratory were found to have lost their

LYNX

YAGOURUNDI

LION



COUGAR

CHEETAH

JAGUAR

OCELOT

BOBCAT

LEOPARD

TIGER

skins and identification was impossible. Those who heard Professor Gage tell his story were suspicious that, personally, he might have been involved. Whether he was or not, one must recognize that men like Gage made enormous contributions to human health and welfare. A kindlier man never lived, and if a cat of mine had been needed for his studies, I am sure that it would have given its life for a good cause. I am also certain that always it would have been treated in a kindly way.

There is no doubt that cats for the most part have earned their place in the sun by the good they have done. Primarily this centered on their ability to destroy rodents, which are the enemies of plants that serve as food for man. As suggested in the chart section of this insert, in modern times this has resulted in the development of what is known as refrigerator cats that are able to survive the temperatures in commercial refrigerators and there keep down the rats that had acclimated themselves. Through the ages, breeds have been developed that are more than ordinarily useful to man. One of the earliest representations of cats shows one that evidently was used to capture or retrieve game birds and ducks. Some cats are reported to have been trained to go through long pipes carrying strings that were used to draw stronger cables through the pipes. I once knew a sportsman in central New York who had a cat that would retrieve game that he shot. This same cat would run and get a ball tossed away from it just as a dog would. We had in our family circle one of the kittens of this cat, and with no training on our part it would run and get a tossed ball.

Trained dog acts are common. The same cannot be said of domestic cats although any circus-goer will remember having seen trained lions and tigers. For the most part, however, cats do not lend themselves to the type of training that makes them perform at will for human beings. Possibly this is a sign of intelligence, or it may be stubbornness or independence. I am not ready to admit that it is a matter of low intelligence among the cats, however.

While literature abounds in man's thrilling experiences with wild cats, it is evident that no one has written a story about cats comparable to such dog stories as *Beautiful Joe*, or *The Call of the Wild*, or plenty of others. For the most part, stories about wild cats are probably badly distorted to make the reader thrilled with excitement, and to make him believe that the author was a tower of strength and courage. In Kipling's *Jungle Books*, there was one cat, the panther, that was the friend and advisor of Mowgli, while another cat, the tiger, was his arch enemy. Seton writes repeatedly in a sympathetic mood about wolves, coyotes, foxes and other canines, but you will not find him showing similar concern for any cats. In his book *Great Historic Animals*, he writes of "The Leopard Lover," but it obviously cannot be considered as a chronicle regarding the normal life of any cat, nor can it be taken as seriously as many of his stories about rabbits, wolves and dogs. Perhaps the most frustrating story ever written is the story of the *Lady or the Tiger?*, and how that came out no one will ever know, since the author did not finish it. The most important character in the story, of course, is a cat.

It should not be necessary here to repeat the material given in the chart section of the insert. Rather, this section may stimulate you to (Continued on page 256)

DOMESTIC CATS

Kind of Cat	Manx Cat	Siamese Cat Sacred Cat Temple Cat Royal Cat	Burmese Cat	Abyssinian Cat
Description	Back, short. Hind quarters, high. Gait, a sort of hop. Can run very fast. Tail, absent but a depression in back of spine where tail should begin. Head, round. Face, broad. Excellent catchers of mice and rats. Coat, double with longer top hairs and the shorter hairs making a dense under-coat.	Trim in appearance. Medium sized. Head, wedge-shaped. Legs, thin, with hind legs longer than the forelegs. Ears, broad at base, pointed and rather large. Tail, thin and of moderate length. Fur, short sleek and close to body. Eyes, deep and slanting. Nervous, graceful and quick-acting. Often affectionate.	Like a small Siamese cat in many respects. Coat is unusually smooth and velvety brown. Considered by many as being a variation of the Siamese cat. Fur is short, close, and chocolate, or sable brown. Eyes are yellow, orange or golden. But for the absence of dark "points" might be considered a Siamese cat.	Head, pointed. Tail, long and tapering. Coat, gray-brown, or red-brown, with spot of dark brown at end of each hair, producing a mottled effect. Hair, short. Legs, long, slender and graceful. Body, lithe. Ears, long-pointed. Voice, soft and weak. Eyes, large and bright. Quiet and extremely dignified. Highly sensitive. Needs liberty.
History and Ancestry	Coat varies but, in judging, the coat and eyes must have a fixed combination similar to those suggested for the long-haired breeds. Colors may be solid colors, or tabby, without affecting show values, so long as body proportions are followed.	Three types: *Seal-point;* light fawn-colored body. Ears, mask, dark brown to black, as are legs, paws and tail. Eyes, almond-shaped and deep sapphire-blue. *Blue-point;* body shading into blue on back but glacial white below. Tail, legs, ears and face, blue. Eyes, china blue. *Chocolate-point;* body, ivory. "Points," chocolate.	Probably this royal cat of Burma, which had long hair and bushy tails, interbred with the Siamese cats when Burma was conquered some 300 years ago, and the modern Burmese cat is the result of the cross, while the purebred Siamese cat is the Siamese cat of fanciers today.	Of Egyptian ancestry and probably associated with Egyptian Goddess of Bast, which gave cats the name of "puss." The goddess had the body of a human and the head of a cat. Rare in the United States, but introduced at Washington, D. C., about 1936. Relatively common in England.
Variations and Standards	Probably came from Isle of Man, and reported to have developed from cats that came ashore there when the Spanish Armada was wrecked in 1588. The original cats apparently came from the Far East. Manx cats first appeared in America about 1820. Are intelligent cats.	Known as temple cats in Burma and "Siam" for over 200 years. First in England in 1884; in America, in 1894. Now more numerous outside Thailand than in. Kittens pure white becoming colored at 3-12 months. Noisy, inclined to use claws extensively on furniture. Young need to be kept warm and dry.	Burmese cats are possibly among the oldest of breeds. In Burma, they were owned only by priests and the wealthy, and each cat had its own servant. The cats were not for sale in Burma. They are gentle, lovable, not usually so destructive as the purebred Siamese and are easily housebroken.	May appear as basic ruddy brown or silver but with black and brown ticking. Brown form is ruddy with 2-3 black or dark brown bands on each hair. Belly and forelegs, lighter brown and with dark stripe running down spine to end of tail. Eyes are yellow, green or hazel. Silvery form also has ticking.

Ancestry and History of Domestic Cats

In Kipling's *Just So Stories*, we read a highly imaginative suggestion as to how the cat became domesticated to the ways of man, to a limited degree. In any serious attempt to treat the same subject, we must also call on our imagination because no matter how we look at it the story is not clear. Our modern domestic cat has its origins undoubtedly in many parts of the world, and traces its ancestry to wild species in Europe, Asia, Africa, and even to some cats in South America. As a general thing, it is safe to say that the long-haired cats may have come from northern Asia, where the Pallas cat roamed the steppes. The short-haired forms came from cats of warmer areas, chiefly, probably, the Kafir cat of Africa. While cats were probably first domesticated in Egypt about 1300 B.C., heiroglyphic representations date back to 2400 B.C., and the first pictorial representation to 1635 B.C. Cats are not mentioned in *The Bible*, and they were probably not domesticated in Europe until the beginning of the Christian Era. In Egypt, they were worshipped and the City of Bubastis was dedicated to cat worship. Here 700,000 persons made a pilgrimage in one year to worship cats. A cat-headed goddess, Bast, was recognized as the Goddess of the hunt, or of love and pleasure. Abuse of cats was punishable by severe penalties. While we find remains of dogs and other domestic animals in the ruins of Pompeii and Herculaneum, we find none there of cats, although they were made into mummies in Egypt. In the Middle Ages, in Europe, cats were feared, hated, and associated with the Devil, darkness, sin and witches, and in England they were roasted in cages before slow fires and generally tortured. Few animals have been feared, worshipped, petted, abused, loved and hated more than have domestic cats.

Reproduction of Domestic Cats

Domestic cats will breed at 10 months of age, or younger. They rarely breed after 14 years of age, but may cease earlier. They may live to 21-23 years of age, with a record of 31 years. Approaching heat is preceded for 2-3 days by excessive playfulness, rubbing and rolling. Height of breeding season may be Feb.-Mar., or may extend Dec.-Aug. at 10-day intervals unless mating takes place. Breeding period may be advanced by extra exposure to light for 50 days. Females in prime at 2-8 years; males, at 3-14 years. Heat may last 2 days to 3 weeks, unless mating is effected. Mating may be repeated at 15-30 minute intervals at its height. Gestation, 56-65 days with normal of 62-63. Birth takes one half to several hours. Mother bites cord and eats placenta. Young and old females have smaller litters. Litters 1-8, or more, with normal of 4. Small females bear larger kittens. Can nurse only 8. Nursing continuous first day, may last 2 months, but usually declines in 4-6 weeks. Female 6-weeks pregnant may mate producing litter of mixed sizes with smallest unlikely to survive. Kittens blind for 10 days, develop milk teeth between 4 days and 5 weeks and permanent teeth at 4-7 months. Incisors appear first and 2nd upper molars last. Male and female kittens grow equally for first 2 months, then males develop much more rapidly. Females in late pregnancy may lose kittens if transported. Male tortoise shell cats usually sterile. In crosses, usually, tabby is dominant over black, except in black of Siamese, short-hair over long-hair of Angora and short tail of Manx over normal tail. When confined in Laboratory cages, male cats behave less normally than females, and females are usually not so receptive as they are if given their freedom. Spaying of females is usually done at 4 months of age. Males are castrated usually at three to six months.

DOMESTIC CATS

Long-haired Cats Persian-Angoras	Short-haired Domestic Cats	STANDARD COLOR DIVISIONS		
		Solid Colors	Tabby Colors	Silvers
Compact-bodied. Head, round. Nose, short. Ears, small. Legs, short and stocky. Tail, fluffy. Hair, long and silky. Voice, soft and well modulated. Not aggressive. More or less indolent. Graceful. Affectionate to owners but reserved with strangers. Original Angora longer-bodied, longer-legged, hair longer and finer than Persian.	The common alley cat, or the usual housecat in the United States, is a Short-haired Domestic Cat. Its body is slender and vigorous. The ears are high. The tail tapers to slender from a thick base and is held on the level. The hair is short and well compacted and of rather uniform length. Chest is deep.	*Black:* Hair a clean, intense black from the roots to the tip, with no suggestion of brown at the tips, or of gray on the underfur. Eyes of black cats should be a deep orange or copper, according to standards set. *Blue:* Color uniform from one end of animal to the other, without shading above or below, or from root to tip. Color should be blue, not drab, and the lighter blue is to be preferred. Eyes are bright orange or copper. *Red:* Deep, brilliant red without shadings or markings. Lips and chin, colored like coat. Eyes, deep copper or orange. *Cream:* Uniform cream color from one end of animal to other, and from base to tips of hairs. Eyes, deep copper or orange. *White:* No colored hairs. All pure white from roots to tips. Eyes blue or rich orange.	*Blue Cream:* Colors blue and cream should be in well defined patches and should be bright and distinct. Eyes, bright copper or orange. Solid colors on tail, face and legs are objectionable to judges. *Brown Tabby:* Ground color, tawny with black markings well-defined in broad lines. Barrings on tail, legs, head, with bracelets meeting body markings. Swirls on cheeks and sides unbroken. Distinct black stripe down middle of back. No ticking on hairs. Eyes, copper. *Red Tabby:* Basic color red, with markings like those of brown tabby but in deeper red than basic red. Eyes, copper or deep orange. *Silver Tabby:* Basic color is pale silver with darker markings, after pattern suggested for brown tabby. Eyes, green or hazel. No brown or cream allowed in coloration. *Tortoise-shell:* Well-defined and broken patches of bright orange, cream and black. Nose, half orange and half black. No tabby markings. Eyes, deep copper or orange. Male tortoise shell cats are rare and are usually sterile.	*Chinchilla:* Hair of undercoat, pure white. Coat of back, head, tail and flanks, black-tipped to give silver effect. Legs may be shaded but chin, ear tufts, chest and stomach, pure white. Eyes, green. Rims of eyes, nose and lips outlined in black. Center of nose, brick red. *Shaded Silver:* Darker than chinchilla. Without markings but shaded down sides, face and tail from dark above to white on chest, chin, belly and under side of tail. Eyes, eye-rims, lips and nose as in chinchilla. Barring or shading of brown or cream is definitely to be avoided. *Smoke:* Color should be black, shading to smoke color, with white undercoat. Ears, nose, legs, paws and tail and mask should be black. Ears on tufts are light silver. Eyes should be bright copper or deep orange.
Original Angora came from Turkey, but its characters of long head, long body, tail, and long hair on stomach have given way to the dominant shorter structures of the Persian, and now the two are considered as one, due to interbreeding. The many differences are primarily of coloration, as listed in charts to the right.	Common domestic cat may be descended from the Kaffir cat of Africa, or the wild cat of Europe, or from a combination of the two. It may also have been crossed with something like the Yagourundi of America in the development of the Paraguayan cat, although this may be questioned by some. Domestic cats are a mixture.			
The Maine Coon cat is probably a descendant of Persian cats that crossed with short-haired cats of Maine at time of French Revolution, and were brought by followers of the unfortunate Marie Antoinette. The Peke-faced Persian may incorporate characters similar to those in Pekingese dogs and is gaining recognition as a breed.	Among the cats that may have contributed characters to our domestic short-haired cats are the stiff-wiry haired Mombas cats of East Africa, the close, scanty haired Paraguayan cat of South America, the Egyptian cat of Africa and the European wild cat of Europe. Typical cat is about 2 feet 5 inches long, with 9-inch tail.			

Care and Feeding of Domestic Cats

Women on relief have been known to more or less starve themselves so that they would have resources to feed their pet cats expensive canned foods. Many other human beings turn cats loose to depend on their own abilities to get a meal. Somewhere between these extremes is probably the happy medium. The appetite of a cat, like the appetite of a human being, is not always the best measure as what is good for the animal. A balanced diet is good for man and beast. Cats feeding largely on beef may become constipated; those feeding largely on fish or liver are likely to have low disease resistance, and one feeding mostly on cereals and vegetables is likely to have poor stamina and many skin disorders. A good diet should assure good constitution, coat, bones, teeth, and disposition—within the limits of the cat's personality. Cats cannot digest bones and stale meat as can dogs. Horse meat may be a staple diet with liver, heart or kidney once a week, and milk at most times. Cereals should be kept in small proportions. The authorities recommend that canned foods should be kept at a minimum. Cats should be given a box or place in which to relieve themselves, and this should be cleaned frequently. They should have a scratching post to save the furniture, a clean, dry, draftless place in which to sleep. They should be brushed once a day to limit the swallowing of free hair and the formation of dangerous hair balls, which may cause vomiting and constipation. Cats may be poisoned by licking things sprayed with insecticides, lysol, carbolated vaseline, and some soaps. Unless you wish to lose your cat do not spray it or rub it with DDT powders.

The Economics of Domestic Cats

Cats were probably originally domesticated to destroy rats and mice that destroyed food useful to man. They still perform that function, in part, and a breed of cats has been developed that can live in commercial refrigerators at 6°F. These cats can, of course, control rats that may have adjusted themselves to similar conditions. Cats have value to pet fanciers, and rare cats, like rare stamps and glassware, have a commercial value. Cats are also used in medicine for the study of diseases, diet, physiological behavior, and for instruction in mammalian anatomy. They have some value for sale to the medical profession in this connection. The fur of cats has some commercial value, and appears as decorative attire of women under the trade name of "genet." Cats are known to carry hydrophobia and other diseases, but this indictment cannot be limited to cats. Cats that have returned to the wild as feral animals are among the worst enemies of small wild birds and mammals. Individual cats have been known to kill 4 rabbits a day; 100 chickens in a season; 40 turkeys in a few days. Forbush records one well-fed house cat that was known to kill fifty-eight birds in one season, including the destruction of five nests. Individual cats may avoid birds, but other individuals may avoid mice and rats, particularly when suitable food is available. A law on the books of New York State states that "Any person over the age of twenty-one years, who is the holder of a valid hunting and trapping license, may, and it shall be the duty of a game protector or other peace officer to humanely destroy a cat at large found hunting or killing any bird protected by law or with a dead bird of any species protected by law in its possession".

OLD-WORLD WILD CATS

NAME SCIENTIFIC NAME	AFRICAN LION *Felis leo,* *or Panthera leo*	TIGER *Felis tigris*	LEOPARD *Panthera pardus*	CHEETAH *Acinonyx jubatus*
DESCRIPTION	Male, to 8 feet long, with 3-foot tail. Height, at shoulder to 4 feet. Weight, to 583 pounds. Lioness may weigh 300 pounds; is to 1 foot shorter, more slender and without the mane of the male. Yellow-brown, without stripes and only slightly lighter beneath. Mane to black in old animals; light in young.	Length, to 6½ feet, plus 3-foot tail. Weight, to over 500 pounds. Female, smaller, lighter, with narrower head. Old male has long hair on cheeks but no mane. Hair, relatively short and smooth. Fawn-colored, with black stripes on limbs and body. Whitish beneath. Occasionally, a black or a white tiger is found.	Length, to 9 feet including tail, which is to 38 inches long. Shoulder height, to over 2½ feet. Weight, to 200 pounds; average 100 pounds. Female, smaller. Tawny yellow, covered with black spots evenly spaced, in groups of 4-5, or in rosette around larger spot. Spots on tail, smaller. Tail, sometimes ringed. Head spots, small.	Length, to 7 feet including tail. Weight, about 100 pounds. Sandy brown, with solid black spots. Bluish streaks on each side of face. Fur short and not woolly. Head, rounded. Feet, rounded. Legs, long, so stands high. Claws only partially retractile. Short mane on neck.
RANGE AND RELATIONSHIP	Order Carnivora. Family Felidae. Ranges through Africa from the Cape to Algeria and Ethiopia; in Asia was from Mesopotamia and southern Iran to northwest India. Formerly through Syria, Arabia and southeastern Europe, and in prehistoric times to Germany, France, Spain and Britain. Now mostly restricted to Africa.	Order Carnivora. Family Felidae. A jungle animal of Asia, particularly in India, and from northern China to Malay Peninsula. Common in Java and Sumatra. Caucasian tigers may have brown stripes. Siberian tigers may measure 13 feet, weigh 650 pounds and have longer, richer hair and stand 3 feet high at shoulder.	Order Carnivora. Family Felidae. Found in Africa from Cape to Algeria and in Asia from India, Burma, Thailand, Ceylon and west to Syria. Formerly through Europe, to Spain and Great Britain. Black leopards in Ethiopia and East Indies. Snow leopard, *P. uncia*, in Himalayas. Siberian panther is long-haired, with blue-gray eyes.	Order Carnivora. Family Felidae. African *A. jubatus* and Asiatic *A. venatica* are spotted, but African *A. rex* is striped. *A. jubatus* ranges from India to the Caspian Sea and south into Africa to Cape Colony and northern Transvaal. Essentially an animal of open country.
REPRODUCTION	May mate for year or more. Variable breeding season. Honeymoon to 2 weeks. Gestation 108 days. 4 to 6, striped and spotted cubs, mostly blind 6 days. Size of large house cat at birth. Nurse 3 months. Young female may die at teething time. Climb when half grown. Cannot kill for self until 1 year old.	Adults pair, but at no fixed time, breeding in alternate years. 2-4 young born 15 weeks and 4 days after mating, but usually 2 young, 1 of each sex. At 6 weeks, follows mother; at 7 months, can kill independently. Family may stay together 2 years. Cubs mature at about 3 years. Captive animals may live 25 years.	Three months after spring breeding 2-5 young are born. Family stays together until young are full grown. Adults may live to 28 years of age. Adults may hunt in pairs, but more often hunt singly. Unfounded rumor that leopard is offspring of male panther and lioness. Young apparently taught by adults.	If taken young are not aggressive, so those to be used as hunting leopards are taken when part grown, tamed and then used. The period of training is rugged to both parties involved. Have lived in zoos to 16 years of age. Total family may number to five. Kittens, 2-4, silky, blue-gray above; tawny, beneath.
ECOLOGY	Mane appears at 3 years. In prime at 5 to 6 years. Average life span to 15 years; record to 25 years. Speed to 60 m.p.h. for 100 feet. Kills to eat, not for sport. Attacks cattle, antelopes, giraffes from ambush, striking at flank or throat. Can leap 12-foot fence or a 40-foot span. Respiration, 10. Pulse, 40-50.	Food is flesh with individuals having definite preferences. Game such as deer, pigs and cattle, sheep or horses. Some old tigers may favor man. Bengal lost 60,000 horses, sheep and cattle to tigers in one year, and some districts lose to 300 human beings a year. A zoo tiger will eat 10 pounds of meat a day to survive.	Food of animals captured by long leaps or pursuit, and seizure of throat and breaking of spine. Eats pigs, goats, deer, sheep, calves, monkeys and donkeys, and favors dogs. May kill man. Is a terrific fighter. Has high intelligence and must be hunted with skill. Can leap upward 10 feet, climb trees, swim. Mostly nocturnal.	Hunts by sight, sometimes in family packs of to five. In 2 seconds can reach a speed of 45 miles an hour, then reach 70 miles an hour for to 500 yards. If surprised, will take to a tree. Have regular scratching trees, and nooses set at these are used in their capture. Purrs when stroked.
ECONOMY	Serves useful role as check on multiplication of plant-eating animals, but may well interfere with domestic animals. Known to kill men, but these are old lions. Can be trained to perform in circuses. Appears in early recorded history, in *The Bible* and in records of early Roman sports.	Male is reported to roar when hit by a bullet, while the tigress remains quiet under similar conditions, but this is not confirmed. Animals are prized as big game and the business of supplying hunters with a tiger is worked down to a science that is economically happy to all but the tiger. May be hunted from trained elephants.	May be trapped easier than can a tiger, using dog as bait. Hunters cannot find safety in trees as they can when hunting tigers or lions. May roll playfully on ground to attract intended prey by curiosity to within striking range. In cold climates, has longer hair than in warm.	Long used as hunting animals, usually by royalty and the wealthy. Have been used as house pets by some. When used in hunt, are usually hooded until animals are sighted, then freed to make the capture, with the hunter coming up after the kill has been made.

NEW-WORLD WILD CATS

OCELOT *Felis pardalis*	COUGAR, PUMA, MOUNTAIN LION *Felis concolor*	YAGOURUNDI, EYRA *Felis eyra*	CANADA LYNX *Lynx canadensis*	BOBCAT, WILDCAT *Lynx rufus*
Length, to 3 feet including 15-inch tail. Weight, to 35 pounds. Slender, well-proportioned. Grayish yellow, with large, black-bordered spots. Ears, black with upper cheeks white. Tail, ringed. Spots on opposite sides do not match. Hair, soft and not too thick but variable in season and individuals.	Length, to 9 feet including 3-foot tail. Weight, to 200 pounds. Yellowish-brown, being darker above and whitish beneath. Nose, rather short. Ears, short and erect. Head, round. Paws, large making track 4" by 4". Toes, retractile. Whiskers, prominent. Like a huge, small-headed cat. Fur, short, close, uniform.	Length, to 50 inches, including 21-inch tail. Height at shoulder, to 12 inches. Weight, to 20 pounds. About 2 times size of house cat. Two color phases; one brownish-red, with white throat and lips, often referred to as *eyra*, and other a solid gray that may be darker in winter.	Length, to 40 inches. Tail, to 4 inches. Shoulder height, to 2 feet. Weight, to 40 pounds but more normally 12-25 pounds. Feet, unusually large. Face, broad. Ears, large and conspicuously tufted, at least in the older animals. Hair, long on lower cheeks. Fur, long and loose.	Length, to over 3 feet. Tail, to 6 inches. Shoulder height, to 23 inches. Weight, to 40 pounds. Reddish-brown, with black spots; lighter beneath. Lacks large ears and ear-tufts of Canada lynx and has shorter legs, hair and tail and smaller feet and head. Is also lighter than lynx, usually but not always.
Order Carnivora. Family Felidae. Ranges from southern United States to Paraguay, and in past may have been found north to Ohio, judging by Indian records. Allied margay is 18 inches long, with 8-inch tail, with black lines and bands and found from Mexico to Peru.	Order Carnivora. Family Felidae. Found in forested areas of the Americas ranging originally from coast to coast in North America, from Quebec to Vancouver Island and south to Patagonia in South America. Eastern variety in North America ranged from southern Canada to the Gulf of Mexico; now greatly restricted.	Order Carnivora. Family Felidae. Found through most Central America and South America and was formerly to be found in the United States in southern borders of Texas and New Mexico in limited areas and numbers. Possibly now no longer found there. Favors thick brushland.	Order Carnivora. Family Felidae. Along Canadian border east of North Dakota to Newfoundland, but over border in New England. Northwest through Canada to northern Alaska and south to northern California and north to western Montana and east to North Dakota. Also in limited areas in Colorado, Wyoming and Idaho.	Order Carnivora. Family Felidae. Ranges from southern Canada south into Mexico except for area in heart of mid-West prairie states. Is found in a variety of habitats, including forests, swamps, farmlands, deserts, mountainous areas and thickets, either near to or remote from settled areas.
Probably breeds in June or July, and bears 2 young in September and October. Far south of United States breeding may take place at any time of the year. Kittens are blind at first. Den is commonly in a cave in rocky country, and nest is well lined with soft bedding material.	Pairs definitely. Both parents care for 1-5 kittens, born at any time of the year 91 days after breeding. Blind to 9 days. First teeth at 18 days. Can crawl at 7 weeks, suck meat at 9 weeks, eat meat at 3 months and get weaned at 3 months. With mother, from 1-2 years and may live, if lucky, to 20 years of age.	May breed at any time of the year and a litter of young may include both the red phase and the gray phase, thus eliminating any basis for the idea that two species are involved. Young have been found at various times between August and March indicating a long period in which breeding may take place.	Female breeds at one year and 2-3 months later, or in May, bears 1-4 kittens. Furred at birth but blind for 10 days and more heavily marked than when older. Male stays with family, but female raises young. Young follow mother at 2 months and family breaks up first winter, or following spring.	Female breeds at about 1 year usually in late winter. Young born 63 days after breeding takes place. 1-4 kittens weigh 12 ounces each, are blind to 10 days. Suckle for 2 months. Cared for by both parents, which stay together at least for the season. Young weigh to 12 pounds by first fall. Captive lived 15 years.
Eats about 5 pounds of flesh a day, including mammals, birds, reptiles and amphibians. Animals hunt alone but on occasion may call back and forth while on the prowl. Prey is seized by neck and held to ground until death. Prey caught on ground, or in trees, and may include animals as active as monkeys.	Food, almost wholly meat, a meal equal to 7-8 pounds of venison. Can drag 900-pound moose 300 feet on snow. Can jump up 15 feet, or down 60 feet, in safety and may range over 20 miles in a night. Home territory claimed may be 60 miles across. Kills prey by lying in wait, springing and breaking neck or biting neck.	Feeds on small animals, including mammals, birds, reptiles, amphibia and insects, as well as fish. May do well in water and at water edge, and has been known as "otter cat" because of its ability in water. Is active day or night, on the ground or in shrubbery, at almost any season of year.	Food, largely rabbits and other small mammals. Swims readily and uses sight and smell to follow prey on ground. May lie in wait above trail. Number of lynxes definitely related to number of available snowshoe rabbits, with population changing in abundance about every 7-10 years.	Food is essentially small animals, with emphasis on rodents. May kill some small stock. One study states that 44.5% are harmful animals that are eaten; 20.5% helpful animals; 16% vegetables; 3% birds. Is probably the worst enemy of snowshoe rabbits, and numbers of bobcats and snowshoe rabbits rise and fall together.
Serves as a check on multiplication of smaller animals and may at times be a serious threat to prosperity of poultry raisers. May also kill kids, lambs and shoats. Does not attack man but fights back if cornered. Can be tamed if caught young and treated properly.	May be a serious enemy of livestock and particularly favors horse flesh and deer. Has been proved to serve useful function in keeping deer population down to carrying capacity of an area. Provides exciting sport, but when cornered seems to wait to get shot. Should not be completely destroyed.	Probably does little harm and is rarely abundant. It may be useful check on destructive mice and other rodents. If caught young, can be made into a pet of limited trustworthiness. Pelt is of no value for fur in comparison with that of most cats.	Useful as check on rabbit and rodent populations. Can fight effectively. Usually will not interfere with man unless cornered, or at bay in a trap. Fur makes a beautiful robe, but has durability only about 25% that of the standard otter.	A full meal equals about ¼ pound of rats. Serves as one of the best checks on the multiplication of rabbits that are highly destructive to forests, orchards, small fruits and other agricultural cultivated plants. Numbers should not be large but it is hoped the animals will never become extinct. They probably will not.

(Continued from page 251)

read the chart section. Most of us, whether we live in a city or the country, get some acquaintance with cats by hearing them at night, either while they are fighting, making love, or both. The section on reproduction in the chart section should give some understanding of what is going on when cats put on their concerts, and may provide some guidance that may be useful in the management of cats.

The section on history and ancestry should show how cats may have developed over the years. It should be obvious that our modern cat may well have developed from a mixture of many bloods. The Maine Coon Cat, for example, apparently has resulted from the crossing of some cats, sent to America by Marie Antoinette, with the short-tailed cats of Maine, and it should be obvious that the long-haired character was dominant over the recessive short-haired breed. This attempt to trace the ancestry of cats may suggest some interesting observations on the possible derivation of the cats of your neighborhood. To help in this we have suggested in the chart section some of the characters that are genetically dominant in such matters.

When considering the breeds of cats in the neighborhood, or elsewhere, a few suggestions may be helpful. The matter of color and of type of hair may not necessarily be a matter of breed. There may be long-haired cats of a great variety of colors and all of the same breed, or short-haired cats of various colors and of the same breed. To help you understand the types of colors that are recognized when cats are judged in cat shows, we have included a section in the charts. This section, of course, is not complete, and should you wish to pursue this, we refer you to the references given here.

It is when we begin to judge cats on an economic basis that we may come to the parting of the ways. No one can deny that a Manx cat is a Manx, but one can definitely differ with another as to whether that cat, or any cat, is a useful member of a community. Bird lovers, light sleepers, sportsmen, and many others, are likely to agree that cats are better off if they are somewhere else than in the neighborhood where they live. On the other hand, stay-at-homes, young children, and old folks are likely to find a reward in the companionship a cat can give, sufficiently to warrant its support. Many of us may be prejudiced by what we may have seen cats do to a family of birds we have been watching, or to the way they interfere with the activities at a bird feeding station. They may also resent the common practice of cats to play with their prey, letting it try to escape, and then recapturing it.

Some will insist that the enemies of cats do not know how good particular cats may be. They may believe that belling a cat, feeding it well, and trying to train it variously, may make a good citizen out of one that is otherwise potentially. Others will contend that there can be no such thing as a good cat. It is to be regretted that cats cannot record what they do and give us the story, so that we might form our independent judgment. In winter you may find and follow a cat's trail in the snow and come to some interesting conclusions. In summer you may use your field glasses and observe what a cat does in a field within certain limitations. It is true that some cats have developed the habit of bringing home some of the things they kill during their nightly prowls. I have known a number of persons who have shown me shrews that their cats have brought home. I once gave a series of talks to Grange groups based on "what the cat brought home," and asked my listeners to keep records of what their cats brought home, and thus come to their own conclusions as to the worth of cats. Unfortunately the story is not quite so simple as that, because one has to give a reasonable evaluation of the prey brought home. Shrews that feed largely on insects give off a disgusting odor, which may account for the fact that cats bring them home instead of eating them. A clutch of nestling birds, on the other hand, may prove to be too delicious to suggest anything except a meal on the spot. However we look at this story it will be incomplete and you will have to let your conscience be your guide.

This article is written with no confidence that it will change the opinion many persons have about cats. I have changed my opinion a number of times during my lifetime, but I rather doubt I shall change it again. As a youngster I particularly liked our tom-cat, named Juno, but I remember how I began to resent the animal. It seems that some remote relatives came to call and tried to get me to talk when I did not want to talk. They then informed me that the "cat must have gotten my tongue." I knew perfectly well that I had a tongue and that I could use it. I was bashful and just did not want to talk to those old folks. Somehow I took it out on Juno. Later, when Juno was killed by a neighbor's dog, I took up the cudgel in his/her defense. Maybe I am still on the fence about cats, but I doubt it. Anyway I must confess that while I like to be on the fence myself I resented the cats that were on the fence last night outside my bedroom window.

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Parks and Open Spaces

"WHAT parks and open spaces mean to the American people, twentieth century park policy and ways and means of acquiring and administering regional open spaces" will concern the National Citizens Planning Conference, which will convene in Washington, D. C., May 23 to 25, at the instance of the American Planning and Civic Association. The meeting is sponsored by a group of planning and conservation organizations, including the American Nature Association. We are using this editorial space to publicize this Conference—which is not called as an annual affair but is held because of the needs of the moment—because we regard the meeting as of vital importance.

This is, says the American Planning and Civic Association, "a cooperative conference, participated in by the leading planning and conservation organizations of the country, especially to examine and meet a crisis which has been building up for a generation. The Conference will seek ways and means to rescue the outdoor heritage of the American people from the many conflicting demands to which it is subjected. Even the recognized standards of the past need revision if our expanding urban population, living in close quarters, is to find convenient access to those scenic, wilderness and wildlife areas with which the United States was once so richly endowed, and which still exist in considerable degree if they are protected from the many threatened encroachments. By all civilized standards the useless sacrifice of archeological and historic sites should be halted."

This Conference reflects the problems created by the unprecedented population growth of this country. With an estimated population of 168,000,000, as 1955 began, and with a total of 290,000,000 predicted by the end of the century, the present and potential impacts of people upon areas are obvious. The steady and considerable increase in the number of visitors to our National Parks is an example. And the fact that these visitors find there facilities designed a generation ago to accomodate one-tenth of the number of present visitors, constitutes a warning that we must look ahead immediately and plan accordingly.

The American Planning and Civic Association points out that "parks and open spaces cannot be considered and placed without regard to other elements in the comprehensive plan. Highways, freeways and parkways must be articulated with each other and fitted into the comprehensive plan in relation to the entire land-use program. The future of parks and open spaces in our metropolitan areas depends on the community and regional planning agencies. Planning commissions and planning officials have a responsibility for providing adequate parks and open spaces, but also for protecting these areas from adverse uses of any kind and particularly from encroachments from other elements in the comprehensive plan."

In the eighty years since Yellowstone National Park was set aside, the Federal Government has placed some 25,000,000 acres of land and water, in a variety of classifications, under the administration of the National Park Service. Percentagewise this is not a large area, and the obvious potential need shrinks the percentage even more. In addition we have acquired wildlife refuges for wildlife preservation and restoration purposes, but with no inconsiderable recreational significance. And we have created, but not yet adequately protected, wilderness areas within our National Forest system.

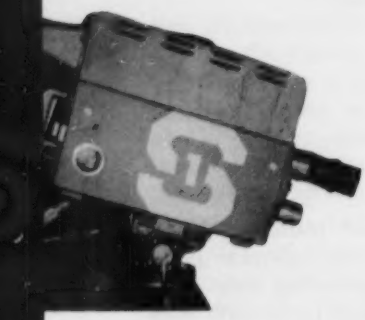
State parks have grown in number and in significance. In 1921 there were State parks in only 19 States. There were practically no systems of State parks. Now all forty-eight States have such parks to a total of more than 1800, with visitors totalling nearly 150,000,000 annually.

It is the challenge of this Conference to evaluate the heritage that exists within all these areas, and to provide and protect, at each level of government, the space our growing population needs for gracious living.

The Conference is open to all interested in this important subject. Further information about it may be secured from the American Planning and Civic Association, 901 Union Trust Building, Washington 5, D. C. Headquarters will be at the Statler Hotel, where reservations may be made by writing to Mr. Victor Bushman.

While the main sessions of the meeting will be on Monday, Tuesday and Wednesday, May 23, 24, and 25, delegates are invited to attend the Maryland Conference on Community Development on Saturday, May 21, at the University of Maryland. On Sunday, May 22, an all-day park tour in nearby Maryland and Virginia has been arranged, including Rock Creek Park, currently threatened by highways, and the C. and O. Canal, subject of widespread publicity.

The conference will attract civic leaders from many parts of the country, and planning, park and conservation officials at each governmental level will be on hand to contribute to and benefit by the discussions. This is a chance to participate in a Conference that can lead to drastic changes in public policy. Such an opportunity does not come often.



Nature Is Successful Video Star

By HENRY W. SCHRAMM

THE HOT battery of spotlights glared down as the television camera, its red "on" light sparkling, moved in for a closeup of little Andy's clasped hands. The tiny, freckle-faced girl spread them apart, and a monarch butterfly dramatically filled the monitor screen. Director Donald Schein's dream of a children's Nature program had come to life.

Since that day early last fall, Mr. Schein, with the expert counseling of Professor Floyd Carlson, in charge of television at New York State University's College of Forestry, has turned out a successful 13-week Nature series over WSYR-TV in Syracuse, New York. With it has come an unusual opportunity for expanding educational television in an area of 600,000 viewers.

Thousands of Syracuse youngsters, and many adults in the station area, have been introduced to the world of Nature about them. They have learned many things from specialists in botany, zoology, and entomology at the College of Forestry and at Syracuse University, co-sponsors of the program.

This series of quarter-hour programs, appearing at noon on Saturdays, has paved the way locally for future Nature shows. Unlike some programs, it is not evident to the viewer that he is being educated. Watching the "Little World" is like sitting in on a pleasant chat with little Andy, her Uncle Bob, and a college professor.

On this show there are no technical monologues with long words. There is not even a script. The spontaneous nature of the program is the key to its naturalness, and its success, which is evidenced in telephone and post-card write-in surveys. Three out of every ten sets tuned in during broadcast time were dialed to the "Little World." In some sections, six out of ten viewers were watching the program.

This would be a good showing for any program. It is doubly impressive when one considers that "Big Top," a nationwide network stalwart of several years' standing, appears at the same time on the competing channel.

The greatest significance of the Syracuse venture is that it is a blueprint for similar series in any city where there is an educational television station, or a commercial outlet interested in community relations and a new and human program. It is a perfect opportunity for Nature groups, educational institutions, and civic organizations to perform a needed service to their localities and to utilize existing facilities that, if the opportunity is allowed to lapse, may be lost.

Willie, the field mouse, a television star, greets the camera from the front door of his cardboard home.

New commercial stations, for example, anxious to get a good start in their area, may welcome the idea for a series of Nature programs aimed at the local community. Legislators or foundation directors, appropriating funds for educational television, will look with favor on good, solid programs. However, if the program slots are not filled, lawmakers and fund donors will be forced to conclude that the region in question is not interested in, or ready for educational video. Chances for future programs on conservation and other vital problems may be lost forever.

In Syracuse, the opportunity was not wasted. Syracuse University and the College of Forestry worked out their series from Mr. Schein's idea after a 13-week time package was turned over to the University's Radio-TV center on two-weeks' notice. The donator was WSYR-TV, one of Syracuse's two commercial

Uncle Bob and Andy are enthralled by Professor Howard Miller's discussion of a tarantula during telecast of program on spiders.

television stations. Syracuse has no educational outlet at present.

Within the fortnight a program had to be developed, props prepared, and the entire show approved by the Television Center's professional staff, headed by Professor Arthur F. Weld, a pioneer in commercial TV in Schenectady and central New York.

The time, noon on Saturday, was about the toughest assignment director Schein and Producer Carlson could have. With "Big Top" for competition, an audience viewing habit of several years' duration had to be broken down. Consequently, a full-scale publicity campaign was launched at once to bring people to take a look at the new show. From there on the show would have to hold audience attention by its own merits.

Local newspapers were receptive to the program idea. Both daily papers carried weekly stories on the program in the television columns. The Sunday *Herald-American*, with a circulation of 120,000, ran a 13-week series of illustrated feature stories concerning the Nature subjects on the previous day's program. This series was exploited on the telecast as an opportunity to build scrapbooks on Nature subjects.

Letters and posters were sent to all schools and libraries in the area. The results were apparent by the immediate interest displayed among teachers and librarians. School and public libraries set up special collections of Nature books under the posters, and arranged for special children's hour and Nature class emphasis on the program material.

At first, some thought was given to presenting little-known insects and animals, but this was vetoed on the ground that, in order to strike a responsive chord with the local audience, it would be best to deal with unusual aspects of subjects familiar to everyone in the area.

Subjects were selected for appropriateness at the time of showing. The monarch butterfly, beginning its southern migration at the time, was telecast first. The cricket was scheduled for New Years in keeping with the saying, "the cricket on the hearth." A discussion of Christmas tree cones was scheduled for the telecast that happened to fall on Christmas Day.

Sparrows and the red-headed woodpeckers were treated during the first snows, with a plea to the audience to feed over-wintering birds. Detailed instructions on construction of feeding stations were prepared and sent free to interested persons. The carpenter ant, beetles, and spiders, often found in homes even in winter, were covered in intervening programs. The winter habits of field mice, chipmunks, and other rodents were featured.

The format of the television series was based on the backyard discoveries of eight-year-old Andy Schein, who brought them to her "Uncle Bob," Robert Spearman, a student in the graduate TV course at Syracuse University. When he was unable to explain the questions Andy asked, he took her to see an expert at the College.

It is there that little Andy was given the factual information; she was primed to ask questions or state beliefs, which were then debunked or verified by the expert. During the course of the programs she learned that butterflies have scales, some spiders use their webs as balloons, and that all true insects must have three pairs of legs. She also learned that, of the 400,000 known kinds of beetles, some, the drugstore species, subsist solely on belladonna and other drugs.

Emphasis was placed on the pleasant aspects of all the creatures. The entire series was the story of Nature's checks and balances, with each animal having a necessary function in the scheme of life.

Even centipedes and spiders, the ugly ducklings of the little world, received their share of bouquets.

"The centipede eats many of the harmful pests that hurt our trees and plants, Andy," Professor LeRoy Stegeman pointed out when Andy professed a dislike for these creatures. "They won't hurt you if you leave them alone. This species can not stand bright light and when you uncover them they think you want to hurt them."

"Spiders," Dr. Howard C. Miller asserted, "eat many mosquitoes and flies that might spread sickness. Spiders are shy little creatures. They bite you only because they want to protect homes and families!

Professor Ralph T. King explains, during telecast, how the downy woodpecker uses its tailfeathers as a brace while digging into tree branch.

Professor Arthur Weld, left, director of Syracuse University's Radio-Television Center; Donald Schein, center, creator and director of "Little World" Nature television series, and Professor Floyd Carlson, in charge of television at State University of New York College of Forestry, discuss programming. (Below) Mrs. Mary E. MacPherson, librarian of children's section at the Beauchamp Branch of Syracuse Public Library, discusses "Little World" program with youthful audience.

Occasionally there was an opportunity to pass along information aiding conservation or scientific research. When the English sparrow was discussed, the expert, Dr. Benjamin Burtt, explained why birds are banded and how people can report the discovery of banded birds to the Fish and Wildlife Service in Washington, D. C.

Visual aids, such as closeup photographs of insects, were mounted on a board in the studio. One camera was continuously focused on the board and switched in at the cue. In the projection room, movie clips of important phases in the life of certain creatures were shown. For example, an Encyclopaedia Britannica film was used for the sequence of the monarch butterfly leaving the cocoon, drying, and spreading its wings. A small blackboard was used for simple drawings by the expert.

Many problems had to be ironed out before the first program was aired. It was decided that the only way the program could remain natural and sincere without experienced professional talent was to avoid a script. This meant everyone had to be at ease and the flow of conversation expertly directed.

Mr. Spearman was chosen to play the part of Uncle Bob because his personality and camera sense enabled him to pick up the dialogue at a weak spot and turn the error to the show's advantage. His job included controlling the conversation so that a specialist beginning to go into abstract terms could be brought back to simple phraseology with an appropriately interjected question or comment.

A child was considered a "must" for the program in order to catch that element of wonder that the adult seems to lose in the process of growing up. Casting a youngster for the role was a difficult task. She must be able to perform without a script, must not be afraid of insects, and must be photogenic.

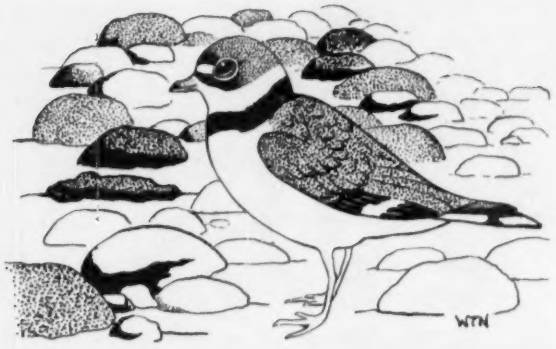
Little Andy fitted the bill perfectly. Yet no one knew what her reactions would be once the cameras were switched on. There was no need for worry. Little Andy had the time of her life. Her mother, watching the monitor set, did all of the worrying for both.

Each program was first discussed with the specialist. Next came a run with the whole cast present. This was followed by a dress rehearsal before camera, the final practice before the show was telecast. Additional rehearsals were cancelled when it was found that Andy became too familiar with the material and acted too well. This lost the childish interest, which added needed charm and simplicity to the show.

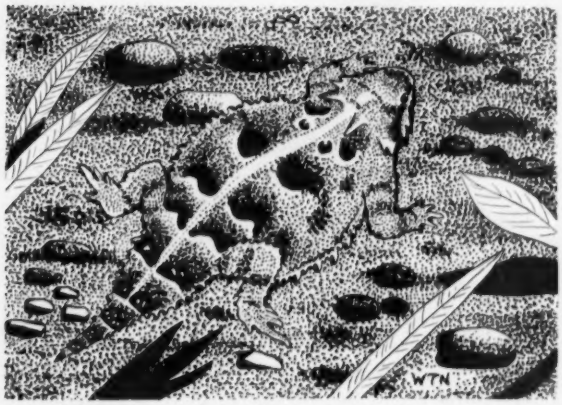
The formula worked. Andy and Uncle Bob became closely identified with the series, lending it essential continuity, which was also established by use of program art work drawn by the same artist who made the posters and illustrations for the newspaper series. A tricky little tune was chosen as the program's theme and served as background for the opening and closing of each program. (Continued on page 271)

Nature's Camouflage

By WILFRED T. NEILL
and E. ROSS ALLEN



The neck ring of a plover separates head and body. From a distance one sees, not the familiar avian outline, but two unrelated masses much like stones and pebbles on the beach.



The pattern of the "horned toad" may duplicate, in both color and texture, the creature's background. The flattened, spine-edged body casts but little shadow.

(Below) Stripes on leg and body all coincide when the frog is in a normal resting position. Dark and light head markings are continuous through the eye, helping to camouflage that organ.

THE French word *camouflage* is now a part of our language; it may signify disguise or concealment. The subject was brought to the fore during World War I, and received even greater attention in World War II. Most of us are familiar with dazzle-painted ships, curiously decorated field guns, and the mottled uniforms that proved so effective in jungle warfare. Comparatively few people, however, realize that camouflage was first used by Nature, and that the subject has long been of interest to biologists.

A great many wild creatures need to be inconspicuous in order to escape their enemies, or to capture their prey. Thus we find many remarkable examples of camouflage in almost every branch of the animal kingdom.

Consider the animals of this country, especially the ground-dwelling species. Most of them are decidedly darker above than below, and many have white bellies. At first, the reason for this may not be apparent. Remember, however, that an object stands out in bold relief if it has darker shadows and brighter highlights than its background. The dark back of an animal lessens the effect of the light that falls from above; the white belly lightens the inevitable shadow along the under parts.

Creatures that are darker above than below are said to be counter-shaded. The authors once saw a museum exhibit that demonstrated very strikingly the value of counter-shading. A duck was mounted in a natural position against a realistic background, with illumination from above. The visitor was invited to back off until he reached a point where the duck was no longer distinguishable from its background. The bird could then be inverted, so that its light belly was upward. In this position, it could be seen clearly at twice the previous distance!

Even the elaborate markings of the jaguar, zebra, and giraffe display counter-shading, the spots and stripes generally becoming less conspicuous toward the under sides of the body and limbs.

The contour shadows of an animal may be neutralized by a pale ventral coloration, but the shadow cast by a creature upon its surroundings is not so easily disposed of. In woods or grassland, the animal's shadow is inconspicuous among those cast by tree trunks, branches, and leaves; but in open, sandy deserts it may be truly revealing. Remarkable as it may seem,

In the open, the South American boa constrictor is conspicuous; on the forest floor it is well-nigh invisible. The reptile's outline is broken up by an elaborate pattern.

some creatures get rid of their own shadows. Among these is the well-known "horned toad," which is actually a lizard. This little reptile, when basking in the open, flattens its body so that only a narrow line of shadow is cast. Even this is broken up, for the edges of the creature's body bear many pointed scales of varying sizes.

Another principle of camouflage may be called background-matching. If you are fortunate enough to study, at first hand, the wildlife of a tropical jungle, you will be impressed with the number of green creatures that dwell among the leafy branches. There are emerald tree frogs and bright green snakes, all sorts of green insects, spiders, lizards, and even birds. On the ground, however, there is a predominance of brownish animals, many of them so mottled as to resemble the debris of the forest floor.

Creatures that dwell on beaches or in the desert are apt to be of sandy colors. Even the texture of the background may be simulated. Certain horned toads, for instance, bear markings that suggest pebbles and sand grains. Some fishes, especially bottom-dwellers like the flounder, actually vary their patterns to resemble the surface upon which they elect to rest.

It might be well to mention that, contrary to popular belief, the familiar little "chameleon" does not always match its background. Its repertoire of colors is limited; and it changes hue largely in response to temperature and to emotional factors.

In many areas, the dark colors of the forest floor may be hidden for months beneath a blanket of white snow. As winter approaches, some of the mammals and birds develop a white coat of fur or feathers. The varying hare or "snowshoe rabbit," dark in summer, becomes almost uniformly white. In some regions, the weasels become white except for a black tail tip. Many people do not know that the prized fur, ermine, is just the winter pelage of a brown weasel! Birds called ptarmigan, members of the grouse family, likewise become white. In the extreme north, some of the hares, foxes, wolves, bears, mountain sheep, and caribou may remain whitish throughout the year.

Counter-shading and background-matching often are insufficient to conceal a creature entirely, and so its general outline may be masked by oddly placed stripes or blotches. Many shore birds, which spend their

lives in the open, exhibit what is called disruptive coloration. The neck ring of a plover neatly separates the head and body, so that from a distance one sees, not the familiar avian outline, but two unrelated masses much like stones and pebbles on the beach.

Many of our common frogs are marked with a pattern that breaks up the form and outline into irregular shapes. One sees, not the body, head, and limbs of a living creature, but merely some dark lines and blotches like the shadows of twigs and leaves. Very commonly, the markings on the body, upper leg, lower leg, and foot all meet when the hind limb is flexed. These "coincident markings" are highly effective in obscuring the actual outline of the amphibian.

Of course, very young animals are especially vulnerable to predators. In certain mammals and birds, the babies are protectively colored in a fashion quite different from that of the adults. The young Virginia deer, for example, is dappled with white spots, which resemble little patches of sunlight filtering through a leafy glade. Only the head of the fawn is at all conspicuous; and when danger is near, mother deer, in some way, cautions the young one to keep its head down. This it will do, remaining motionless and wellnigh invisible for hours at a time.

Bobwhite chicks are marked with spots and stripes, quite unlike the adult. Young bobwhites are never helpless nestlings; they are active little balls of down almost from the moment of hatching. At the approach of an enemy they scatter, peeping shrilly; but in obedience to the mother's signal they crouch motionless on the ground. Often, when tramping the fields, one stumbles on a brood of bobwhites. The chicks may be heard peeping right under foot, yet not one can be seen!

The eye of an animal is a difficult organ to disguise. It is usually round, dark, and glossy, unlike any other object in Nature. Little country boys can often find a rabbit "in the bed" by looking for the dark, shiny eye. A great many frogs, lizards, and snakes display a black line on the side of the head, running back from the eye to the angle of the jaw. Thus the eye becomes merely part of a dark line, like the shadow of a twig. In various species the head bears dark and light stripes, all of which are continuous through the iris.

Not only can pattern break up and disguise actual form; to us it may create the illusion of surface modeling where none exists. Apparent examples of constructive shading are to be found among leaf-dwelling insects. (Continued on page 275)

The head of the fawn is conspicuous; the body is not. When danger threatens, the mother deer somehow warns the young one to keep its head down. It will obey, remaining motionless for a long time.

PHOTOGRAPH BY TOD SWALM

The Desert's Crown of Thorns

By LUCILE WEIGHT

Photographs by Harold O. Weight

One of the easiest marks of identification of the "Crucifixion Thorn," if flowers and fruit are lacking, is the characteristic upward trend of the spine-tipped branchlets. Burros and goats are said to relish the nut-like fruits, but the spikes are usually a deterrent.

OUR most unusual botanical discovery was made when an icy storm caught us in Yuha Basin near the Mexico-California border. Knowing a desert storm's potential, we emerged from this eroded wonderland by a short-cut, a sandy rut often impassable.

Intent on reaching higher ground, we saw no portent in the wildly swirling wind to tell us that this day was to be a rarity. We had just turned our backs on plum-black Mt. Signal, astride the Border, when the hail stopped. Uncommon rains had brought early bloom to this burroweed-creosote desert. Its usual February gray and olive now were embroidered with the yellow, white and pink of evening primrose, forget-me-not and sand verbena. We even noticed unseasonable purple flowers on smoketrees. And, as we peered ahead through storm mist, we had the illusion we saw other smoketrees, but ones that were strangely coarse and larger than those flame-shaped wraiths common to low desert washes. As sun splintered through clouds, the trees shimmered before us. When we came abreast of them, we stared, unbelieving.

The trees were Crucifixion Thorns. Here was a whole dry lake of a species supposedly non-existent in this part of the desert. *Holacantha emoryi* had interested us for years, and we thought we were fairly familiar with its range. Its only Imperial County occurrence, so far as we knew, was "east of the Chocolate Mountains," at least seventy-five miles away.

Hitherto, *Holacantha's* area has been shown as bounded roughly by a line northwest from Yuma, Arizona, to east of Barstow in San Bernardino County, California, easterly to the Colorado River near Needles, across the river to north and east of Phoenix, Arizona, curving southwest between Tucson and Ajo to the Mexican Border, then northwest to Yuma.

In California, we had seen *Holacantha* at several places, and knew of other isolated occurrences. A single specimen has been observed in Sheephole Pass, east from Twentynine Palms, and another on the eastern slope of the Cady Mountains, both in San Bernardino County. A group once grew at the site of the Metropolitan Water District's Hayfields Reservoir, in the Chuckawalla Desert between Indio and Blythe, in Riverside County. But all these were within the "official" area, while here in the southwest corner of Imperial County was a veritable forest of this tree-shrub. It was by far the most extensive stand we ever had seen. The specimens, moreover, were the largest we had observed, many of them growing ten to fifteen feet high.

Holacantha is a strange, forbidding, tree-like shrub. No leaves adorn it. It is "complete thorn," as its name indicates, with every upward-trending branchlet tipped by a rigid spine. Seedling plants, however, are finely feathered with divided leaves, and we saw many of these babies under the mother trees—for *Holacantha* is unisexual, the staminate and pistillate flowers on different plants. The small, greenish-yellow flowers,

Discovery of this large stand of the "Crucifixion Thorn" extends the known area of the species in California and raises some interesting questions about plant migration. This stand is in southwestern Imperial County, California, just north of the Mexican border.

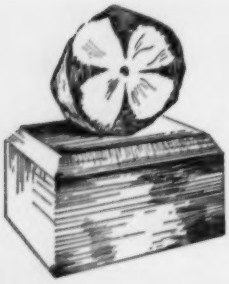
blooming from May to July, grow in thick clusters. The resulting little round seeds hang in bunches for several years, appearing at a distance like birds' nests, or mistletoe. These nut-like fruits are said to be liked by burros, but either these animals were scarce here, or the thorns proved discouraging. The extreme spininess doubtless is responsible for its association with the Crown of Thorns, or as the Spanish-Americans say "Corona de Cristo," supposedly worn by Christ.

At least two other Southwest species, *Canotia holacantha* and *Koeberlinia spinosa*, share Holacantha's common name, Crucifixion Thorn, but this is the only native American member of the Ailanthus Family. A better known Ailanthus is the Tree of Heaven, introduced from China and now growing as an escape.

Holacantha probably was first collected November 15, 1846, by Lieut. Wm. H. Emory, as topographical engineer with the Military Reconnaissance from Fort Leavenworth, Missouri, to San Diego, California. Because it lacked flowers or fruit, Dr. George Engelmann, who examined the drawings sent by Emory, could not identify it. Emory saw the specimen near the Gila River just after crossing Arizona's Jornada del Muerto, and this is one of the type localities given when the plant was officially noted in 1854.

As we wandered among the spiny trees, our curiosity mounted. Besides not conforming to rules of size, locality and extent of stand, these Imperial County *Holacantha* caused us to question Dr. Forrest Shreve's statement (in *Vegetation of the Sonoran Desert*) that they "never" form pure stands. We saw only a few scattered creosote bushes, *Larrea*, these mostly edging the dry lake.

But our curiosity went farther afield when we contemplated their possible origin. One botanist states they are southern Arizona plants that spread west to California. He did not suggest a possible time of migration. But this new locality raises interesting speculations about such a movement. Most of Imperial County has been under water at various periods, both historically and pre- (Continued on page 276)



The chiastolite formation provides the emblem of Ye Old Timers Mineral Club.

Stone Stars of Sterling

By ALDEN S. WOOD

Photograph by Charles Cocaine

WHEN the great glacier ground its way down through Massachusetts, it did mineral collectors a notable favor. This inexorable ice continent, as it engulfed a ledge in Sterling, Massachusetts, known as George Hill, broke off fragments of rock and scattered them south of the hill in a six-mile strip of glacial drift. In itself, this would not be unusual, except for the fact that this rock contains chiastolite, a semi-precious mineral found only in three other places in the world.

Chiastolite, its name derived from the Greek word *Chiastos*, meaning "a cross," is a variety of andalusite occurring in clay slates near a contact with granite. During the process of crystallization, certain carbonaceous impurities were dispersed across the stone, which now displays, from this cause, different forms of cross, tesselated or lozenge-shaped markings that stand out clearly when the stone is cut or broken. This singular feature has earned for chiastolite the appellation of "stone star."

Mineral collectors highly prize a good specimen of chiastolite. Often the processes of metamorphosis have stretched or altered the cross shape into unrecognizable smears, but a persistent "rock-hound" can turn up a pretty good cross if he prospects long enough. I knew one shrewd collector who discovered some excellent chiastolites simply by using his wits. Instead of trudging about the hill, or along the drift, he followed one of those venerable stone walls that criss-cross New England acres. Sure enough, it was a matter of minutes before his practiced eye spotted a pair of cherished crosses in one of the stones. Replacing this stone with a random boulder, he strengthened the wall as well as his mineral collection.

Running between 3 and 7.5 on Mohs' scale of hardness for minerals, chiastolite can be worked into attractive jewelry. Often found in a black matrix, and themselves colored gray, yellow, pink, red, deep brown or white, the chiastolites take a high polish. Indeed, it is said that Columbus wore a charm made of this stone during his voyage to America.

Legend surrounds the chiastolite as far back as it can be traced. It is reported to have been first found in Andalusia, Spain, at which (Continued on page 274)

A polished specimen of chiastolite in matrix showing the cross formation. This is not a perfect specimen but, nevertheless, quite a good one.

The Muir Woods Albino

By GEORGE S. WELLS

Photograph by the Author

One of the least known but most intriguing sights of California's Muir Woods National Monument is an albino redwood tree, which stands out like a careless swatch of white paint on a canvas of forest green. Located beside the main trail, within arm's reach of passersby, it should logically call forth exclamations from every visitor. A pure white tree is rare in any species, and is especially rare among the *Sequoia sempervirens*, or coast redwood.

Yet, few persons ever notice this tree unless a ranger points it out during a guided tour. The reason may be that the eye seldom sees that which the mind cannot credit. More likely, however, it is due to the strange lighting of the redwood forest, where narrow shafts of sunlight move in slow motion, striking sparks from every shiny surface.

Even naturalists and silviculturists, who often come armed with trail maps to see the "mystery" tree, have been known to pass it by, so that they had to retrace their steps in more careful search. Such mild frustration, however, is more than repaid by a single glimpse of the albino.

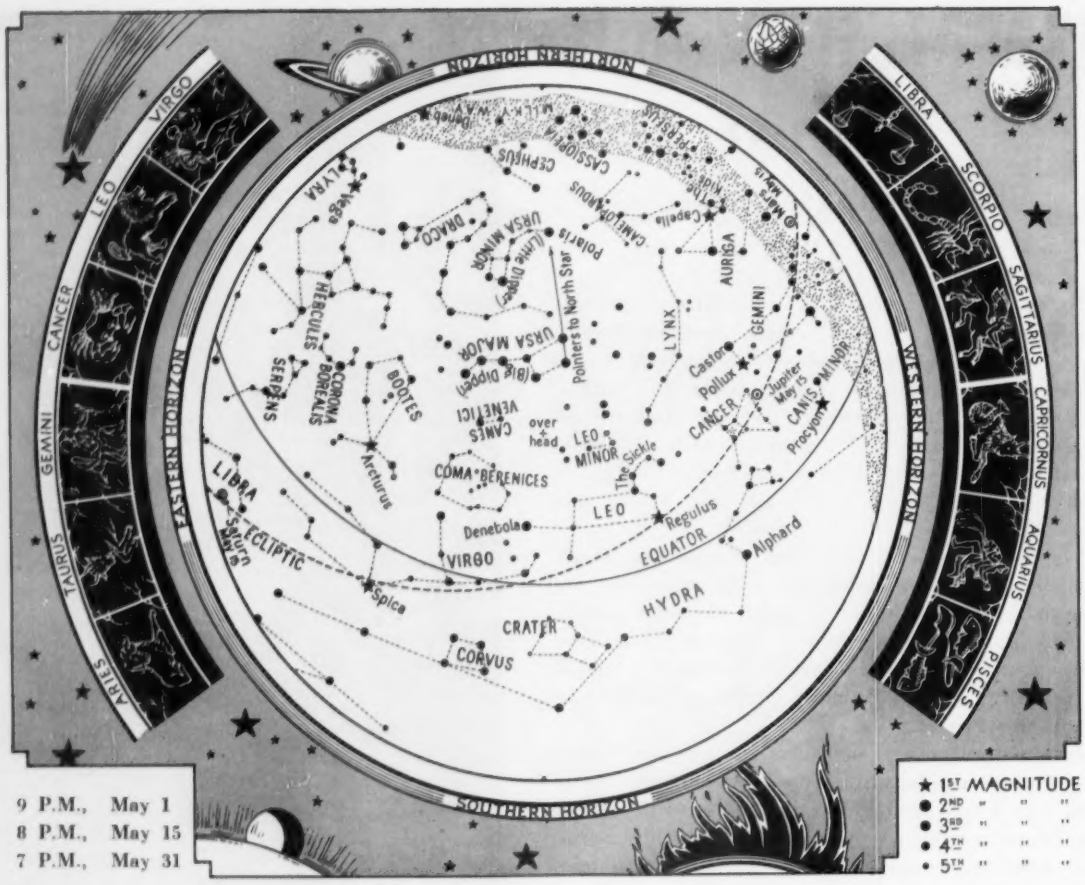
The tree stands about eighteen feet in height, its trunk the thickness of a man's forearm. Aside from rather slight imperfections, its branching is as normal and fully developed as that of its green-leaved neighbors. Authorities estimate its age at thirty years. Were it not white, it would be just another tree of the forest. But because it *is* white, it is a sort of beautiful monstrosity living on borrowed time. Already the tree has lived longer and grown larger than any other pure albino redwood known, and, although a complete lack of chlorophyll is considered to be lethal, the tree still shows no signs of frailty or fading.

A partial explanation of the albino's survival is its attachment to the root system of another tree, since this is an obvious source of the food that it cannot manufacture by itself. But the three other albino clumps that Monument Superintendent William H. Gibbs has noted in his forest are typically weak specimens, which die back each year and may soon disappear altogether.

Prof. Emanuel Fritz of the University of California's School of Forestry, who is an outstanding authority on the forests of the West Coast, frankly admits that he does not know why the albino redwood has survived so long, although he has observed partial albinos that have managed to attain a girth of fifteen to twenty inches. Albinism in any degree among the redwoods is rare, however, and he adds that "I have seen only about half a dozen in thirty-five years."

Light patterns of the redwood forest make the albino tree difficult to see. It stands at the center of this picture, in full view at the edge of Muir Woods trail.

As far as is known, no pure albino has managed to bear cones. It is doubtful, in any case, that the tree could be reproduced from seed, since, as Superintendent Gibbs commented, the albinos "cannot stand strong sunlight and generally dry up if exposed to it." Neither has any attempt been made to develop the white redwood into an ornamental plant, as has been done with juniper, thuja and English ivy. Perhaps it is because it might not be too convenient to have this tallest of the world's trees in one's dooryard.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Charles Messier, "Ferret of Comets"

By SIMONE DARO GOSSNER

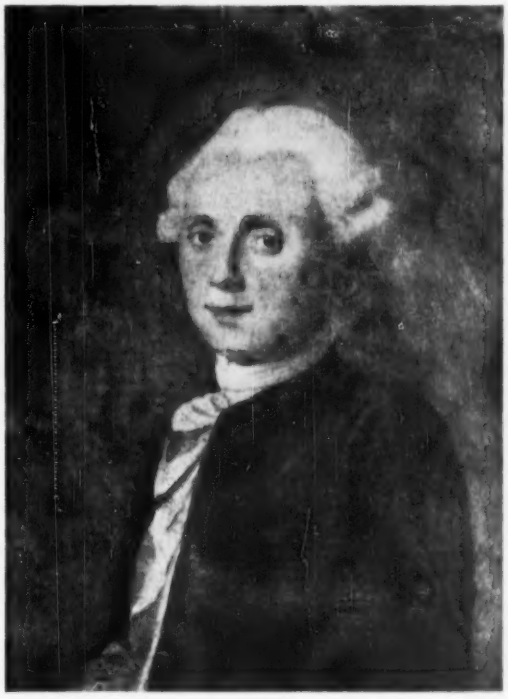
THE latter half of the eighteenth century was one of the greatest epochs in French astronomy. The names of Laplace, Delambre, Clairaut and de Lalande, to mention only a few, still rank among the most important in the history of their science. But there were also many others who, like Messier, were more concerned with the accumulation of observations than with the interpretation of their results. Such painstaking work has always been essential to the progress of astronomy. The observer himself, however, often remains unknown to posterity. If it had not been for an unforeseen turn of events, Messier's name long ago would have been forgotten.

Charles Messier was born in Badonvillier, in Lorraine, on June 26, 1730, the tenth child in a family of twelve. His father died in 1741, and an older brother looked after his education. When he was twenty-one, Messier came to Paris to work for the astronomer Delisle. In those times, astronomers were often cartographers as well, and Messier's first assignment was to copy a chart of the Great Wall of China, and to reduce to one-fourth a huge map of the city of Peking. The map was so big that his office was too small to accommodate it, and he had to work in an unheated hallway. Unaccustomed to such lack of comfort, especially in the wintertime, the young apprentice found the going rather rough. But the experience served to toughen him up for the long nights he was to spend at the telescope in the course of his career.

When Delisle ran out of maps to be copied, he decided that the time had come to give Messier his first instruction in the use of telescopes. Messier was

an apt pupil, and soon became a skillful observer. At that time, astronomers were interested in the first predicted return of Halley's Comet, which was expected early in 1759. Delisle had devised several methods by which the comet could be detected with a telescope before it became visible to the naked eye, and delegated to his pupil the task of scanning the skies. This Messier did zealously for a year and one-half. But Delisle's computations fell short of the mark, and Messier's work was mostly in vain. The comet was sighted in Germany, in December, 1758, and again in the following month. No word of this reached Messier, however, and he observed Halley's Comet independently on January 21, 1759.

This was the beginning of a long career of comet observations. In the course of his life, he observed 46 comets in all, of which 21 were considered to be first discoveries. He won wide acclaim in western Europe, became a member of the French Academy of Sciences, and was elected to many foreign academies. Louis XV, king of France, called him "his ferret of comets." As a matter of fact, Messier had come to consider comets as his own property. In 1772, while he had interrupted his observations in order to care for his dying wife, another astronomer discovered one, and the gossips of the time claimed that Messier was more distressed by the loss of a comet than by the death of his wife.



COURTESY "SKY AND TELESCOPE"

CHARLES MESSIER, 1730 to 1817.

Messier's enthusiasm was not limited to comets alone. Perhaps no one described his careful observations better than his colleague Delambre. In a note on Messier's life, prepared for the French Academy of Sciences, he wrote in 1817:

"We can say that during his long career, he has never neglected any opposition or conjunction of planets, or an eclipse of any kind. We are indebted to him for a considerable number of observations of eclipses of Jupiter's satellites; and because he had an excellent eyesight, as well as an excellent telescope, he would almost always see the immersions later, and the emersions earlier than any other astronomer. . . After Lalande had called the sunspots to the attention of the astronomers, he observed them for several years, and has left us an ample collection of these observations."

It was Messier's zeal that led him to compile a little opus entitled *A Catalogue of Nebulae and Clusters*. The telescopic appearance of a comet is that of a fuzzy dot. The astronomer who is scanning the sky in search of unidentified comets would, therefore, pause whenever seeing an object having a fuzzy appearance. Unfortunately, nebulae and star clusters also answer that description when viewed with a small telescope, thereby causing considerable waste of time to the anxious comet-seeker. His annoyance at these unnecessary delays prompted Messier to keep a record of such objects, for the sole purpose of avoiding them. Ironically, the astronomical world has mostly forgotten Messier's comet observations, but the introduction of large telescopes has made his *Catalogue* a classic in the literature on nebulae and clusters.

The list the astronomer compiled contains all the brightest and best known nebulae and stellar aggregations the structure of which has been revealed by the modern telescopes. Each one was assigned a number in the order in which Messier had added it to his list, and even today they are still designated by that same number, preceded by the letter M in honor of Messier.

These Messier objects fall mostly into five categories—galaxies, globular clusters, open clusters, diffuse nebulae, and planetary nebulae.

The best known galaxy is undoubtedly M31, the great spiral in Andromeda. Another familiar one is M51, the Whirlpool nebula. It is located in the constellation Canes Venatici, and can be seen easily with a six-inch telescope and low-powered eyepiece.

Globular clusters are huge concentrations of stars, spherical in appearance, as their name indicates. Single clusters average at least 100,000 stars, and could conceivably contain as many as a million. Our Milky Way system includes about a hundred of these clusters. Almost all of these were discovered by Messier and the Herschels. The Hercules cluster, M13, is visible to the naked eye, but the observer will require a star map for its identification, at least on his first attempt.

Open clusters are loose assemblies of stars, which share a common motion in space. The most familiar example is M45, the Pleiades. Others such as M44, Praesepe in Cancer, may be seen with a small telescope.

Diffuse nebulae are true nebulosities that derive their light from the stars imbedded in them. They are found exclusively along (Continued on page 276)

The School Page

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

CATS IN SCHOOL

AN ELEMENTARY school principal in my home town this week ruled against a dog obedience class having meetings in his gymnasium. The school is located in an area where dogs of all sorts are abundant. For the most part, they do not know what obedience is. Undoubtedly, the principal will glibly say that education prepares one for life, yet he closes his eyes to the fact that the pupils of his school live in an environment in which canines will always be a factor. He has decided that he will not have dogs in his school, and that is that. I wonder how many other conspicuous elements of his environment he has ruled out of consideration.

We have all heard about Mary bringing her lamb to school, and we all know of plenty of dogs that go to school with their young masters. Many of us feel that it is a good thing for children to learn how to get along with pets, and we feel that they can learn something about this in school. Why, then, can we not give some thought to what can be learned from cats in a school room?

Cats unquestionably have been reasonably successful animals. Surely, they get as much from man as they give, and not all domestic animals can make any such claim. How do they do it? What do they have that gives them the privileges they have? Is it just that they feel soft, purr gently, rub against you, or catch a rat or mouse now and then? I do not think so. I think that it would be worth-while for children to study how cats differ from them, and in what respects they are superior or inferior to cats. Let us start with the senses.

Anyone will admit that under some circumstances a cat can see better than we can. They could not prowl around at night as much as they do if their sight was no better than ours. Look at a cat's eye, at a cow's eye and at the eye of a human being. You will see that there is a conspicuous difference in the irises of the three eyes. In humans, the iris is round; in cattle it is more or less horizontal; in cats it is vertical. It should not be difficult, with the aid of a flash-light, to get a cat to demonstrate the changes that take place in the shape of the iris when light becomes stronger or weaker, and it should not be difficult to learn from a cat's behavior how quickly it can adjust itself to changes. Then, it might be interesting to find if the cat can adjust itself better than can a dog to changes in light intensity. It should be noted that the vertical iris in a cat's eye may have some significance in the fact that a cat that may feed on birds should be able to have a wide angle of vertical vision, or does this not make sense? And if this holds for cats, how do we explain the situation in the eyes of a cow?

It is obvious that cats have some ability to smell their environment, but it is also obvious that in this respect they cannot match dogs. A catnip ball obviously appeals to a cat, not because of what the cat sees, hears, or feels in it. Plainly it is a case of smelling. Knowing this, and using catnip oil or leaves rubbed on different substances, you may figure out some interesting experiments that will help you understand better what ability a cat may have to smell.

Another series of investigations regarding cats may well center around their sensitivity to touch, and an exploration of their bodies to find out where these centers are most highly developed. The use of the whiskers to detect the size of holes into which it is safe for a cat to enter might well be considered. Make some simple studies to determine if there is any part of a cat where you can touch its fur and not get some evidence that you can be felt by the cat. Undoubtedly cats are among the most sensitive of our domestic animals so far as the sense of touch is concerned. How does this fit into their food habits, and their other types of behavior.

Because a cat is so independent, it may not be easy to learn too much about its ability to hear. However, there are some sounds to which they will respond better than to others. Watch a cat's ears when it is hunting to see if there is evidence that it seems trying to use them to get sounds from any particular direction. Under what circumstances, if any, does a cat fold back its ears, and can it direct them to the rear without turning the head. How does this hold with a cow, a dog, or with other animals?

Flavors added to milk might be useful in trying to see if a cat has any sense of taste, and any particular preferences in this matter. Fish oil, catnip oil, and other materials with a strong scent may be used.

The ability of cats to land on all four feet when dropped is, as one knows, exceptional. It is not likely that any other domestic animal can approach cats in this respect. Is it possible to drop a cat from any reasonable height and not have it land on all four feet? Watch a cat as it walks on a fencetop, or along any narrow base. Notice how it uses its tail to help maintain a balance. Could a cat do this tight-rope walk successfully if it was not free to move its tail? Notice how the climbing animals, such as squirrels, deer mice and the cats, have long tails that help them keep a balance, while the ground animals, such as rabbits and meadow mice, do not have tails that can help them much to maintain equilibrium. These studies may help children to get a real appreciation about the relationship that may exist between structure and behavior in many animals. In cats this is so spectacular that it seems a shame not to study cats instead of books to find the answers.

The chart section of the special insert gives some suggestion of the geographic aspects of cat study. This applies to the habitats of the wild cats, and to the origin of some of the blood in the ancestry of our ordinary house cat. Knowing something about this is really worthwhile. Where, for example, is the Isle of Man, after which the Manx cat is named? Where is the island of Malta, from which Maltese cats came? Where is Egypt, Siam, Burma, Peru, Russia, and other areas whose names appear in describing Siamese cats, Bengal tigers, African lions, Siberian tigers, and so on? Surely the geography teacher can find something appropriate in cat study that will make foreign lands more significant than they might be otherwise.

Collections of pictures of cats, wild and domesticated, of stories about cats in magazines and newspapers, of local incidents in which cats have warned human beings of fire, injured them by scratching, contracted hydrophobia, or otherwise have attracted attention, should be made.

Children might be interested in making a pooled report on the animals they have seen cats kill, or which cats have brought home after a night on their own. What such reports reveal may be more important to the children than reports that have been compiled by government officials in some distant office. More important, the children will themselves have helped collect data that has helped them come to a reasoned conclusion. There can be no question but that the value of cats is controversial. What is wrong with having children themselves help to form a judgment on a controversial issue?

Cats offer good opportunities for studies in health, nutrition, and sanitation. Cats respond to intelligent care, and often such care is limited. The problem of having abandoned cats become feral, to the detriment of birds and small mammals cannot be overlooked when drawing up a balance sheet. Where cats are in trouble the children may in some cases want to be instrumental in calling on community services that are set up to care for abandoned domestic animals. This may lead to some really dynamic study of civics, and the social structure of the community in which you live. With all these opportunities at hand to study cats do not keep them entirely out of the school. You will lose out if you do.

NATURE IS SUCCESSFUL VIDEO STAR

(Continued from page 260)

A great deal of the preparation was done by the scientists, who appeared without pay. They gathered necessary visual materials and many went into the field for several afternoons to collect live specimens. Because creatures such as the praying mantis die before winter, it was necessary to collect live mantids several months before they were used.

Dr. Miller had a small menagerie of mantids, crickets, beetles, and a giant wolf spider in his office, and had to keep them well-fed and comfortable for two months. One day, while feeding the wolf spider, he placed his hand too close to the hungry creature and became the program's only casualty.

Professor William Webb, who used "Zoo Parade" techniques on his telecast of rodents, for three weeks housed his little cast of house mice, white mice, field mice, and guinea pigs, in his office at the college. They set up a ceaseless shrill chattering from morning to night, making work almost impossible.

Live specimens of the English sparrow were collected by Dr. Burtt, who combines a career of professor of chemistry with an avocation of ornithology. He is currently banding and testing the homing reactions of the English sparrow, and consequently had a supply for his show.

No one, however, managed to collect a live chipmunk or downy woodpecker. Professors Maurice Alexander and Ralph King used mounted specimens for their appearances, but supplied excellent visuals, including samples of nesting places, drawings, and photographs.

The programs had periods of technical tribulations. Everyone viewing the rehearsal before the initial broadcast were sometimes certain the entire production would falter. Cameramen were out of position, the picture often out of focus, and some of the slides were projected upside down or in wrong order. Besides that, actors missed cues and little Andy kept trying to talk with her hands over her mouth. Everyone was on edge. Nothing went right. However, in the best tradition of the theater, the poor rehearsal preceded a successful opening the next day.

Persons affiliated with the program, including Professor Carlson, who has twenty years of educational radio experience and is a pioneer in educational television, hold high hopes for the "Little World" and similar programs to whet the interest of youngsters in the community. A test kinescope recording has already been filmed with Ford Foundation equipment at Syracuse University, and the show may be aired at other local stations and educational networks.

When the final program was announced, a flow of fan mail from parents, teachers librarians, and other citizens urged continuance. Syracuse public library officials found the programs stimulating children's interests in books on Nature. Sunday School teachers used the programs as discussion material.

Any city offering television can have a similar program. It is the opportunity of a lifetime for organized Nature groups, garden clubs, and similar organizations. Service clubs such as Kiwanis or Rotary, educational institutions, Boy and Girl Scout executives, and others, can join forces to present Nature and conservation programs. Once established, Nature study programs from astronomy to zoology can be undertaken.

It is vital, however, that immediate local action be taken. Here are ten steps suggested by professional television personnel, that any organized group can take to make local educational video a reality:

1. Present your ideas for programs to interested groups. Enlist support of educational institutions, libraries, and museums.

2. Work out series that are simple and within the scope of available talent and facilities to produce. Center them around a specific theme. Then provide for program continuity.

3. Cooperation of local television stations must be sought. If free time is not available, institutions or foundations may financially support the shows.

4. Local newspaper releases and other public relations must be coordinated to lend emphasis, and to advertise the programs.

5. Choose casts with care. Talent must be capable. Ease and naturalness are essential. Specialists in natural sciences and conservation are available in almost every school and college and through state and federal agencies. Stand-ins for all cast personnel are essential in case of that sickness or accident.

6. Museums, zoos, and private collectors can furnish most of the props. Movies and film strips can be obtained from film libraries at studios, colleges, and industrial concerns.

7. Avoid scripts. Stilted, artificial conversation results. Avoid talking directly to the audience. Let the apparently spontaneous chatter among the cast carry the message.

8. Subject matter should be discussed thoroughly prior to presentation.

9. Program planning and timing require professional attention. Local television stations and university workshops are good sources of technical advice.

10. Once a program series begins, it must be seen through to completion. Profit from each program's experience. Continue to polish the product.

Educational television needs the immediate wholehearted support of everyone interested in furthering the studies of natural science and conservation. Otherwise it may die in infancy.

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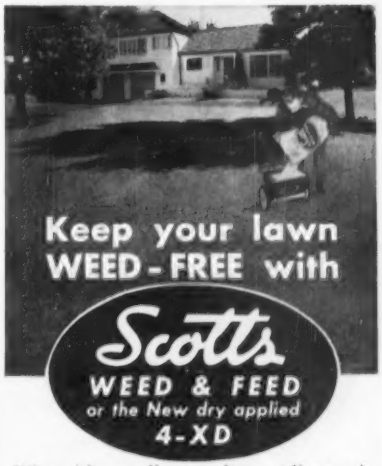

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Camera Trails

By

EDNA HOFFMAN EVANS

No one who has visited the swamps of the Deep South could fail to be impressed by the cypress trees growing there.

THIS month I am going to write about trees. In doing so, however, I am going studiously to avoid quoting from Joyce Kilmer's famed poem on the same subject. While the selection probably had a great deal of charm when it first came from poet Kilmer's pen, it has long since been spoiled for me by numerous over-sentimental renditions by tenors who probably would not know an oak tree from a maple. So, with that personal observation on the subject of "Trees" out of the way, let us forthwith consider the subject of trees.

I do not suppose that many people actually set out to photograph a tree, or a group of trees, *per se*. Trees usually get into the picture because they appear in the background and thus are included automatically. Yet, as individual subjects, they do present numerous interesting photographic possibilities.

Years ago, the *Saturday Evening Post* used to run a pictorial feature showing trees in silhouette. Those tree silhouettes took on strangely human or animal characteristics. I can remember Joshua trees that looked like dancers in some elfland fantasy, a heavy foliaged tree that looked like a lion, and a gaunt tree skeleton that resembled an evil old witch. I cannot remember, although I have tried, whether those silhouettes were actual photographs, or the product of some artist's brush. They did, however, make an impression on me, even as a youngster, long before I knew anything at all about cameras.

Remembering those silhouettes, when I came here to the land of the Joshua tree and the saguaro cactus, I began to look for likely silhouette subjects. I shot a lot of film that first year, trying to make boxers, or dancers, or other human characters from the desert giants. To be perfectly honest, my efforts were not too successful. A cactus is a cactus, and a Joshua tree is what it is. Imagination helps, of course. But why try to stretch Nature to such a point that it loses its native beauty and becomes, instead, a caricature of something else?

My experiences (and failures) along this line have lead me to decide that those long-remembered anthropomorphic silhouettes in the *Post* were drawings rather than photographs. I wonder whether any "Camera Trails" reader happens to recall those same silhouettes?

Having reached the conclusion that I cannot compete with the artist's brush, I have shifted my sights somewhat. Thus, while I still watch for possible tree silhouettes, I tend to pay more attention to the trees, themselves. They do present interesting and varied photographic possibilities.

It is better to take a picture of a single tree than it is to take a picture of a group of trees, that is, if you wish to preserve any outstanding details or specific characteristics. The person who first said "You can't see the trees for the forest" may not have been a photographer, but he was stating a photographic truth.

The subject, then, should be a distinct individual, whenever possible. Trees growing by themselves frequently have a better all-around shape than do those that are crowded by their fellows. Of course, the very solitariness of the tree has other influences on its shape, especially in regions where the wind comes usually from one direction and buffets the tree constantly.

Along the coast — be it Atlantic, Pacific, or Gulf — you will find such wind-blown trees. They make interesting studies whenever you find them, and of whatever species they may be.

Also, along the coast in semi-tropical and tropical areas, the coconut palms make excellent camera studies. All palms are graceful trees with their slender, long-sweeping fronds. But coconut palms are especially so because of their gracefully curving tranks, in addition to their feathery fronds.

It is not always necessary to take a straight-on view of a tree. In this type of picture taking, as in most others, it is well to look for "angles," and for points of view that are different from those usually seen and photographed.

This is an up-the-trunk shot of a coconut palm.

This gnarled conifer, perched at the edge of Yellowstone Gorge, seemed to me to make an excellent study of sturdy, steadfast, experienced age.

Whether it appears so or not, the coconut palm picture here is not a straight side view of the crown and cluster of green coconuts. Instead, it is a modified up-the-trunk shot, with the camera placed against the bowed trunk and aimed upward. Palms, of course, with the single center from which all else about them radiates, are particularly suited for this type of photograph.

There is one difficulty, photographically speaking, and that is determining the correct exposure. The under side of the crown is usually in deep shadow, while the sky above is exceedingly bright. The lens must be stopped down to cut out the brightness, and yet the exposure must be so gauged to retain detail in the shadows. And, since there is usually a brisk shore breeze blowing where the coconut palms grow, one cannot shoot too slowly without getting a blur of movement. One other difficulty, not photographic, that I recall in connection with this picture has to do with mosquitoes. They seem to thrive in the shade of the coconut palms, and they are always hungry.

Another kind of tree that loves the water is the cypress. No one who has visited the swamps of the Deep South could fail to be impressed by the cypress trees growing there. Their wide, swelling trunk bases — like old fashioned hoop skirts of bark — their "breathing" knees, their feathery green foliage, and the long streamers of Spanish moss that drape their branches all serve to make them beautiful. The problem is, once again, to find specimens sufficiently isolated to make good subjects for photographs.

I solved that problem rather accidentally last summer while on an outboard boat ride on a Florida lake. Shots from the open water toward shore were not worth much, even in color. With black-and-white film almost all detail was lost. However, when we landed in a white sandy cove, after threading our way between numerous sentinel cypress trees (all cypress haunts, incidentally, are not black, muddy, and full of snakes and alligators). I tried a shot from shore out. It looked good, so I took several.

Luck was with me that day. The light was right; that is, it came from an angle toward me on shore, and yet was high enough so as not to shine directly into the camera lens. It threw long shadows from the tree trunks, getting deeper from one side of the picture to the other, shadows that fell toward me rather than away from me. There was enough breeze to make a definite ripple pattern in the water, and yet not enough to cause too much movement in the moss and cypress foliage. All in all, I think this picture is one of the most satisfying (to me) cypress scenes that I have ever taken.

Like other camera subjects, trees do not have to be in the bloom of youth or the flush of full, healthy adulthood in order to make striking pictures. While babies have a universal appeal, old people, too, are excellent camera subjects. So is it with trees, also.

The gnarled conifer that helps to illustrate this section I found perched on the edge of Yellowstone Gorge, in the national park in Wyoming. How many years it has grown there, braving winter blizzards and summer storms, with the wind always sighing in its branches — when it is not howling — I have no way of knowing. But the old tree, with its living portions as well as its whitened, weatherworn skeleton, seemed to me to make an excellent study of sturdy, steadfast, experienced age.

Because it was so perched, almost at the edge of a breath-taking drop, the tree was not the easiest of subjects to photograph. I climbed through the protecting rails of

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the plank walk leading out to the Gorge viewpoint and sat me down, with my back against one of the walk's supporting timbers. I was below the tree and a few feet too close to it. But there was no way to change my point of view, short of growing wings or anchoring myself to a cloud. Other viewers eyed me curiously. No doubt they decided I was just another camera fan (excellent deduction) and let it go at that.

And so, from the graceful tropical palm on the seacoast to the stately cypress on the shore of a southern lake, and then to the element-beaten conifer in Wyoming, we have three contrasting subjects, each telling its story in its own particular way. Trees do make good camera subjects whenever and wherever you find them.

Ansco's new All-Weather Pan film is strikingly packaged in red.

TRADE NOTES

IN A red envelope, on a red letterhead, and with a red box, Ansco has just announced its newest All-Weather Pan film, designed especially for amateur photographers.

All-Weather Pan, according to advance publicity, "represents years of scientific research and the perfection of an entirely new manufacturing technology. It employs exclusive new color sensitizers, developed by Ansco chemists, and never before used in film manufacturing."

To continue, Ansco claims that All-Weather Pan, "being a panchromatic film, has the ability to reproduce the entire range of the color spectrum, including red, a color to which 'chrome' type films are insensitive." In addition to giving better rendition of skin tones, the new film is also supposed to have the ability to overcome chalky highlights that are characteristic of gross overexposure, while its increased speed does much to eliminate the possibility of underexposed negatives, even under extremely unfavorable light conditions.

The new film has an exposure index of 64 for daylight and 50 for tungsten. It is available in 120, 620, 127, and 616 sizes in single rolls and in the economy three-roll pack for the first three sizes. It was to be made available at all retail film outlets shortly after March first of this year.

FROM JAPAN

MANY veterans have come home from Japan with Japanese-made cameras. For those, and others who have seen the Japanese equipment, this announcement may be of interest. The new Nikon S-2 35mm camera is now available in this country through Nikon, Inc., 277 Fifth Avenue, New York 16, N.Y. So are other Nikon and Nikkor products and attachments. For further information, write the New York address.

TIOGA ROAD

(Continued from page 236)

According to your nature, you will either regret leaving it or rejoice that it is past. You reach a 9737-foot summit, then drop a thousand feet into Tuolumne Meadows, where the river of that name winds its devious way. These meadows, lying in the basin of an ancient lake and circled by soaring, snow-crowned mountains, are approximately ten miles long and two miles wide. They are dotted with Indian paintbrush, red heather, potentilla and fishermen. This is a famous camping and fishing area, and is also notorious for the size of its mosquitoes. In early summer the meadows may glitter with frost-sequins while banks of snow line the road at the eastern approach.

Tioga Road now begins its final upward swing, reaching its highest elevation of 9941 feet at Tioga Pass and leaving the Park. Flanked by majestic Mount Conness to the north and Mount Dana to the south, it passes Tioga Lake, northwest of which is the deserted mine responsible for the Great Sierra Wagon Road. Perhaps nine-tenths of your trip will have been up the Sierra's western slope, for these mountains rise sharply on the east and roll out for miles toward the Pacific.

You will have started your trip in the Transition Zone, which begins at about 3000 feet. It is marked in lower elevations by western yellow pines, incense cedars and Douglas firs. The giant sugar and white-needle pines appear at 5000 feet, along with scattered sequoia groves. A little higher the Jeffery pines take over and run into the Canadian Zone at 6000 feet.

Near Gin Flat the road is in the Canadian Zone, with small or medium red and white firs standing in dense forests. There, too, the lodgepole pines, or tamaracks. And many storm-scarred western junipers pose in magnificent strength on open, rocky slopes. The quaking aspens, darlings of the mountains, with their ever-shimmering, heart-shaped leaves, are the only hardwoods extending into this Zone.

The Hudsonian Zone, touched briefly at Snow Flat, is again entered at Lake Tenaya, and the road continues in this zone until reaching Warren Fork of Leevining Creek. As you approach the Hudsonian you begin sighting scattered stands of western white pines, a tree that really has what it takes to survive. This area, from 9000 to 10,500 feet, is dotted with graceful mountain hemlocks and those scoffers at the elements, the white-bark pines.

Just below Tioga, and still in the Hudsonian Zone, Ellery Lake marks the head of Leevining Canyon, down which the road sweeps in a grade that is considered one of the most spectacular in the world. The route cuts across shale-slopes, plunging downward, or is carved into a granite cliff where white-painted rocks are comforting angels at the road's brink.

At Warren Fork, Tioga Road snuggles away from the canyon, into a haven where you may get back your breath and enjoy one last portion of grandeur that has been so lavishly spread for you. Here you leave the Hudsonian Life Zone and, after four miles of this dramatic ten-mile grade, are following easily along the creek to the junction of Route 395 near Mono Lake, seventy-six miles from Yosemite Valley. And you, even as John Muir, will have ". . .crossed the Range of Light; surely the brightest and best of all the Lord hath built."

STONE STARS OF STERLING

(Continued from page 266)

place Saint James was supposed to have suffered martyrdom. Looking back farther still, legend tells that chiastolite originated in a rock upon which the hand of the Apostle rested. A stone of the zodiacal Capricorn, chiastolite is the symbol of prudence, faith, caution and sincerity.

One of the world's finest chiastolite collections is owned by Gustav H. Fyhr of Worcester, Mass. Mineralogy curator of the Worcester Natural History Museum, and secretary-treasurer of Ye Old Timers Mineral Club, an international organization of more than 600 members, Mr. Fyhr has scores of the cruciform mineral. In his cellar workshop, he has cut and polished chiastolites for distribution to friends and club members all over the country. One of his own exhibits is most unusual. Cutting chiastolite prisms to less than dime thickness, he placed a score of them in a picture frame between two panes of glass. When illuminated from behind, the white crosses stand out strikingly. Too, Mr. Fyhr has what may be one of the largest specimens in the world. An inch in diameter, this stark white specimen is in the shape of a Maltese cross.

Sometimes known as hollow spar, and by early Spaniards as "lapis crucifer," the chiastolite is found only in Massachusetts, California, Spain and Australia. Among the hundreds of fascinating minerals that the hand of Nature has placed in the earth's crust, these delicate crosses rank with the most beautiful.

NATURE'S CAMOUFLAGE

(Continued from page 263)

In many cases, a concealing pattern is combined with one bright spot of color—a "flash-mark" that remains hidden most of the time. The pickerel frog of the eastern United States is difficult to see amid grass and leafy debris. If a predator noses him out, he leaps wildly. As the hind limbs are extended, a bright orange spot in the groin is suddenly revealed. We may suppose that the predator is momentarily diverted by the flash of color; he searches vainly for another glimpse of it, and overlooks the frog now hidden in the grass. Perhaps the orange spot also advertises the noxious nature of the pickerel frog, which has a poisonous skin secretion.

In wooded glades one may encounter the under-wing moths. These beautiful insects are marked with bands of red, orange, or white on the hind-wings; the fore-wings are mottled, and resemble bark. The moth flies in swift, erratic fashion, and the brilliant color flashes out, catching the eye. Suddenly the insect drops on a tree trunk, folding the fore-wings over the hind ones. The observer may hunt fruitlessly for another glimpse of color, and never spy the moth resting quietly on the bark in plain view.

A famous example of camouflage is the Kallima leaf butterfly, found in Asia. Its fore- and hind-wings are marked above with rich blue and orange; below, they are colored like a dead leaf, complete with midrib, veins, and moldy-looking spots. When the insect alights in a bush, it practically disappears. In this species, protective resemblance involves not only color but also form; the wings are thoroughly leaf-like in shape.

Concealment is not advantageous for all wild things, however. Wasps and other venomous creatures are often ringed with red and black, or with yellow and black. These colors are danger signals, warnings to would-be predators. Quite a few harmless creatures display similar livery; they flaunt themselves boldly, may be mistaken for the venomous species.

Many bright-colored male birds are conspicuous during the breeding season, seeming to draw attention away from the drab female and her nest full of young.

The white rump of the prong-horn antelope, visible at a great distance, enables the individuals of the herd to locate each other. The white outer tail feathers of some birds are thought to keep the flock together during migration. The bright plumage of many birds is displayed during courtship proceedings. The colors of certain male lizards apparently intimidate rivals during contests for territory or for the females. The fire-bellied toad flops on its back when molested, disclosing its garishly colored under parts. The Louisiana newt, when chilled almost into a state of helplessness, will curl its tail in a spiral over its back, revealing the orange or red under surface. The newborn copperhead has a sulphur-yellow tail tip, which wriggles like a worm, enticing small prey within striking range!

It is well known that heat is absorbed by darker tones and reflected by the lighter ones. Many of our common frogs and lizards become very dark in cold weather. In such cases, the optical effect of pigmentation is secondary; heat conservation is much more important. In mid-summer these same species are likely to be at their palest, and to reflect as much heat as possible. Some lizards of the desert, exposed as they are to extremes of temperature, are often capable of turning from whitish to nearly black.

Thus color is put to many uses throughout the animal kingdom, but its chief function is probably that of camouflage. Look around your backyard, or in a nearby lot, and see if you can find a dozen remarkable examples of concealment. Search carefully or you may overlook some little creatures. Perhaps you can find a yellow spider resting in a yellow flower, or a green tree frog in a cluster of leaves. The bole of a tree, especially an oak, should yield moths, beetles, and spiders colored much like the bark. In the bushes you may see a walking-stick or a cone-headed grasshopper, insects that are twig-like in both color and shape. A big, green leaf may turn out to be a katydid. If you are fortunate you may discover the nest of a ruby-throated hummingbird, or of a wood-pewee, covered with lichen; such nests may seem a part of the branch on which they are built. Watch the butterflies when they alight; some species fold and tilt the wings, to leave only the thinnest line of shadow. Study the garden toad when he emerges at dusk; motionless, he is indistinguishable from the ground on which he rests. Such examples make us marvel at Nature's camouflage.

For Archaeologists

Down to Earth. By Robin Place. New York. 1955. Philosophical Library. 173 pages. Illustrated. $7.50.

This is a popularly written guide to archaeology. It covers the fundamentals of dating, recording, and interpreting, and includes detailed accounts of all of the principal kinds of "digs" and "finds." The author has an obvious enthusiasm for his subject, and seeks to show how the layman can cooperate in archaeological research.

World Day

From Clifford Pratt, 54 Eagle Road Toronto 18, Ontario, Canada, comes word that "World Day for Animals" or "St. Francis Day" will be observed on October 4 of this year. Mr. Pratt will be happy to send further information with respect to this observance.

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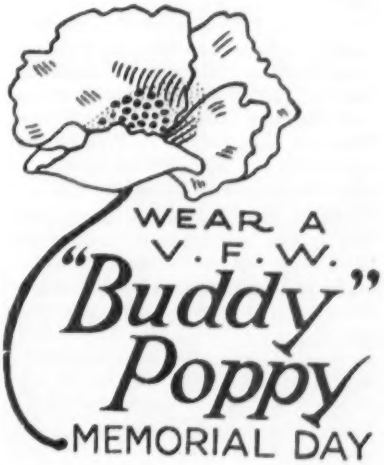

A WARBLER OF THE CANEBRAKE

(Continued from page 246)

to serenade a prospective mate. In early spring it seems to restrict its singing mostly to the ground, but, as the nesting season approaches, it seemingly spends more time in trees. In spite of these habits, it is essentially a terrestrial bird.

Swainson's warbler is a rather nondescript species. The ovenbird is probably closely related to it in behavior, since it feeds, sings and spends most of its time on the ground. In appearance it closely resembles the worm-eating warbler, which frequents the underbrush. Although Swainson's is the most characteristic species of the canebrake, it is not the dominant one. In close association with it are hooded warblers and cardinals, both of which are more abundant.

Although its terrestrial habits and white stripe above the eye identify it adequately in the field, a good discriminative character is the *tschip* note. Sometimes the notes vary so that they somewhat resemble the sharp sounds emitted by the phoebe, wood pewee, Kentucky warbler, or swamp sparrow. Nevertheless the Swainson's notes are distinctly different from those of its relatives.

After the nesting season the birds retire to darker parts of the thicket and forest, and are seldom heard until spring. When a wave of warblers passes through their territory in autumn, Swainson's pays little attention, and rarely associates with the migrants. During the latter part of September it leaves the summer habitat for its winter home in the Caribbean. Flying to Florida, and perhaps along the Gulf Coast, it makes its way eventually to Jamaica, Cuba, or Yucatan.

This warbler's history is one of the most romantic of our southern birds. Three famous ornithologists figured prominently in the discovery and description of this bird. In 1832, the Reverend John Bachman collected the first specimen known to science just south of Charleston, South Carolina. A year later he collected Bachman's warbler not far from there. He showed both specimens to his celebrated artist-friend, John J. Audubon, who named the first after the prominent British ornithologist, William Swainson, and the other after Bachman. William Brewster and Arthur T. Wayne were apparently the first to write extensively about its interesting behavior.

Despite its unassuming appearance, this warbler has excited the imagination of many ornithologists all along the eastern seaboard. Its ability to make itself inconspicuous has perplexed many observers, but as more students take to the field, cautiously invading its canebrake habitat, and even resorting to crawling at eye-level with it, this little-known species will become increasingly familiar. In the meantime we can only say that this bird of the canebrake will remain an enigma until its secretive and specialized behavior is further studied.

THE DESERT'S CROWN OF THORNS

(Continued from page 265)

historically, as a sea and as part of the Gulf of California. This locality is separated from the previously reported northeast area by a vast alluvial fill, which has known the sweep and recession of many waters. Elevation of the *Holacantha* locality is less than 250 feet above sea level, although previously published limits have been 500 to 2000 feet.

Is *Holacantha*, then, the sole remnant of its abundant tropical family, which may have been prominent here in an earlier era? Did it migrate westward from its last stronghold in Arizona during some long period when no sea or gulf waters disturbed its progress? Or did it move north out of Baja California, where it would have been less interrupted in its course? There is evidence that an arm of the Gulf once extended to this area. And Dr. Shreve maps *Holacantha* along the upper Gulf in Baja California. Did seeds drift along the ancient shore line, or were they carried by animals?

Paleontologists have correlated fossils in western Imperial County with species in the Gulf of Mexico and elsewhere, helping to sketch in the evolution pattern of the present land. Comparison of these findings with study of the distribution of plants common to both sides of the Southwest Border might produce a working hypothesis for tracing the origin of the "lost" *Holacantha*.

Another facet of the mystery that makes this *Holacantha* even more a botanical island is its association with a second species not listed for this area—*Hoffmanseggia densiflora*. At first we did not recognize this low, feathery-leaved perennial making a ground cover under the *Holacantha*, for in this desert we were familiar only with the graceful wands of *H. microphylla*. Yet here was an Arizona plant making itself at home in California with another supposed Arizona migrant. What affinity or what circumstances could have banded them together on their little "island?"

Western Imperial County, within historic times, has had several lakes and dry lakes, most of which are now obliterated under alfalfa and vegetable fields. But on some of the old maps one still can see these remnants of the past. We could not find this dry lake identified on any map consulted, so we named it Holacantha Dry Lake, and it is now so shown on at least one published map.

Reading journals of explorers, I had thought one of their greatest thrills must have been the first sight of a strange wild plant. But it is little less a thrill to discover a known species in an area yet unrecorded. We still have a feeling of unreality about the find, for this is a desert where mirages bring visions of strange lands and creatures, of vanished seas and lost ships. Except for tangible evidence of photographs, we would only half believe in Holacantha Dry Lake.

CHARLES MESSIER

(Continued from page 269)

the Milky Way, and in the spiral arms of outer galaxies. The large Orion nebula, M42, is faintly visible to the naked eye, south of Orion's belt. It is more than a thousand light years away.

Planetary nebulae are rare and interesting objects. They appear in the shape of a gaseous ring surrounding a star. Their name originated from the theory that planets could possibly be formed by the gradual cooling of this outer ring. A six- or eight-inch telescope is sufficient to reveal the general appearance of such planetaries as M57, the well-known Ring nebula in Lyra, or M27, the Dumbbell near Cygnus.

The position of most of the Messier objects may be found in Norton's *Star Atlas*. Their observation can be a fascinating experience to anyone who has access to a small telescope, even though the detailed structure of these nebulae and clusters can be revealed only by the larger instruments.

Messier's *Catalogue* was, however, ignored by most of his contemporaries, who, like him, saw in it no more than a list of nuisances.

The French Revolution brought great financial stress to many French scientists. The Royal Academy was abolished, and Messier lost his pension and his salary. A widower, without children, he was cared for by a niece. He suffered a stroke in 1815, and died at the age of 86, on April 12, 1817.

In the month of May, the Moon will be full on May 6, and the New Moon will occur on May 21.

Mercury will be in the evening sky. It will be most favorable for observation in the latter part of the month. It will reach its greatest eastern elongation on May 20, and will set nearly two hours after the sun on that date.

Venus will be still in the morning sky, rising about an hour before the sun.

Mars will be in Taurus, and will be visible in the early evening, setting at about 9:15 P.M. on May 15.

Jupiter will be in Gemini, setting at about 11:30 P.M. on May 15.

Saturn, in Libra, will be visible all night on May 15.

Uranus will be less than 3° away from Jupiter throughout the month and will be easily seen with ordinary binoculars. The nearest apparent approach of the two planets will occur on May 10; their angular separation will be one minute of arc on that date.

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UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

THE WRONG ALGA

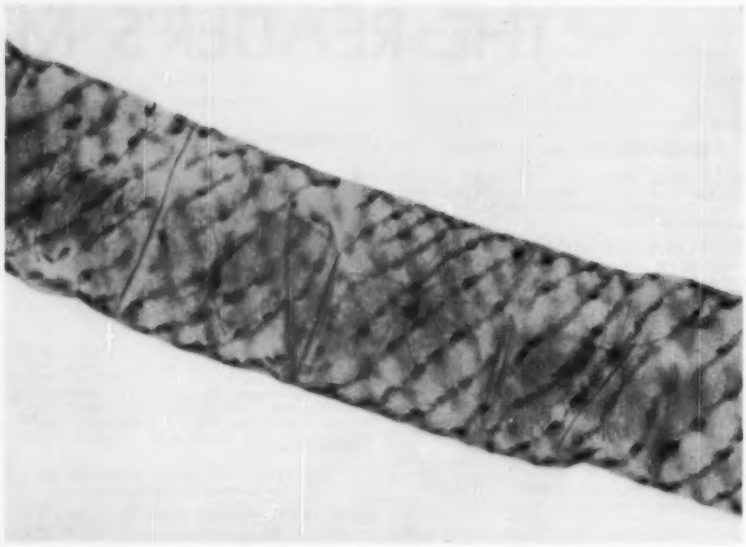
Age cannot alter her, stale custom doth
Not seek her infinite variety.

SOME of the mores of the service, in the teaching of biology have, like Topsy, just growed up with the development of the science. Why do we use *Hydra* as the standard form of the whole Phylum Coelenterata when it does not have any medusoid generation at all? Why do we dissect the clam as representative of mollusks when it has no head? Surely *Nereis* is more typical of annelids than is the headless *Lumbricus*, even though the inland student cannot bait his fishhook with the clamworm. The answers to these and similar questions are various but mostly center around inertia. The species is common or cheap, or of convenient size (often all of these) and somebody started using it and wrote it up in a manual. Thus the students have something by way of laboratory directions, and the supply houses know what to stock in

Low power view of strands of Spirogyra.

large quantity, and the instructor takes the easiest way out, and each author copies, with some emendations, from his predecessors, and soon there is a *tradition* to use these forms and only these forms.

And should you imagine for a moment that tradition here is any less powerful than in the world beyond the cloisters, just try to get the profession to adopt a change, no matter how sensible the arguments. George Zebrowski, one of the ablest preparators and technicians in the land, has tried for years to persuade teachers to use the vinegar eel, *Anguillula aceti*, as the type form of the Phylum Nemathelminthes instead of *Ascaris*. It is free-living, microscopic, abundant, and cheap. All organs of the adult, all sexes, ages, and stages may be seen readily under low power; no dissection or equipment is necessary. Result? No sale. The manuals and texts have *Ascaris*, so *Ascaris* it is, although handling the living worms is dangerous, they are much more difficult and expensive to procure, and cross sections on slides of both sexes are required, notoriously refractory to process.



Vegetative cells of Spirogyra, showing spiral chloroplasts, pyrenoids and nuclei.

In botany the situation is not quite so bad; there are fewer flagrantly poor choices of type specimens, and perhaps it may be said that more species of plants in a given group are "typical" than is true of animals.

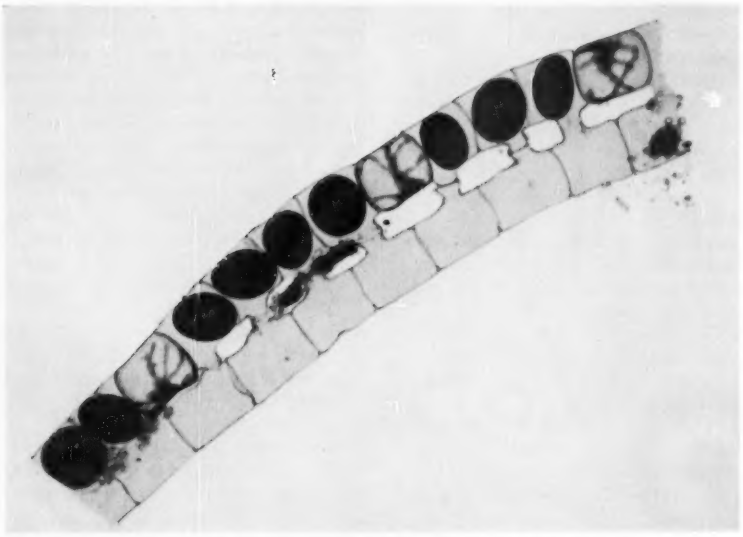
But the early writers of high school and college botanies and lab. manuals backed the wrong horse in their choice of a "typical" green alga, most important group of the Division or Subkingdom Thallophyta, for they selected *Spirogyra*, which accordingly ascended with celerity to an unwarranted fame. Everyone who has ever studied biology or botany has drawn and pored over this pond scum or water silk, assuming it to be *the* representative of the entire group. Let us first describe this plant and then enquire as to the suitability of its selection.

The green algae or Chlorophyta (greenplant) are a numerous tribe, with 360 genera and 5700 species (Fuller and Tippo). The plant body is a thallus and this may be unicellular as in diatoms, colonial as in *Volvox*, or multicellular as in spirogyra. The color is a grass-green; that is, a yellow-green, as in higher plants and not as in other algae, such as the browns and reds. This is due to the fact that the dominant pigment present is chlorophyll. Taking the form of chlorophyll *a* and chlorophyll *b*, these greens are associated with carotene and xanthophyll, respectively deep yellow and pale yellow pigments, of unknown functions in plants.

Chlorophyll is contained within definite bodies called *chloroplasts* or *chloroplastids*, commonly spherical or ovoid, but ribbon-shaped in spirogyra. There may be one to many of these per cell; one or more in spirogyra, many in *Cladophora*; and it is this structure that imparts the bright green color to the whole plant, or to the leaves and green stems of higher plants. As is well known, these bodies perform photosynthesis in the green plant, putting together carbon dioxide and water, with radiant energy from the sun as the motive power, to make starch. Basically, all the food of the world depends on the chloroplast. Plant cells synthesize sugars, then dehydrate these to starches, and condense and store some of these as fats and, with nitrogen and other elements from the soil added, as proteins. Animals, lacking this power, must obtain their food from plants, or from animals that have in turn fed on plants. Plants are the great manufacturers and conservers of the world, animals the great consumers and destroyers.

An advantageous place in which to see this all-important stuff, chlorophyll, is in the spiral chloroplast of the spirogyra cell (Gk., speira, coil; gyros, a ring). As the microscope is focused up and down, one can follow the spiral windings of this handsome green ribbon around the inner periphery of a cell that is in this wise revealed as cylindrical. It has long been a good teaching device to require students, after they have observed spirogyra for some time, to construct a model of the individual cell by using a testtube to represent the cell wall. Inside the tube is placed a paper cutout, shaped and colored to delineate the chloroplast.

Seen in sectional view, or on edge at the periphery, the chloroplast is shaped like a trough, the concavity facing outward. A thicker central strand forms the bottom of the trough and at fairly regular intervals expands to enclose a small oval body, the *pyrenoid*, a specialized part of the chloroplast that has to do with starch formation. The chloroplast is itself embedded in the



Conjugation of Spirogyra, most of the cells with zygotes.

cell cytoplasm, of which there is a thin but dense peripheral layer inside the cell wall, and numerous strands that take off from the inner face of the pyrenoids and pass radially toward the cell center where a cytoplasmic mass surrounds the nucleus. Cytoplasm and nucleus collectively make up the *protoplast*. The bulk of the interior of the cell constitutes a large fluid-filled *vacuole*.

As mitosis occurs always in one plane, the original cell multiplies lengthwise to form a filament, and there may be enormous numbers of these in any specified area, forming a slippery mass of green threads in both fresh and stagnant waters. The fine, hairlike individual strand has a mucilaginous sheath of pectose, feeling slimy to the touch. While one strand is a multicellular plant, there is no given amount per individual; elongation may continue indefinitely. Generally there will be accidental breaks, the separated part then becoming a new individual. Animals eat portions; other sections may be washed ashore. Asexual reproduction by fission in most species of these pond scums is thus a fortuitous matter.

But spirogyra is more versatile than its simple organization might lead one to believe. In the spring with some species, autumn with others, two filaments that lie side by side initiate the sexual process of *conjugation*. The cells of each strand produce dome-shaped protuberances that meet one another, the intervening cell walls are then digested, and in this manner *conjugation tubes* between adjoining cells are established in *scalariform* (ladderlike) *conjugation*. Now occurs one of those events that mystifies everyone who observes it, from novice to experienced botanist. The protoplasts of one of the two conjugating filaments round up and shrink away from their cell walls by loss of water. Each such protoplast then migrates across the intercellular bridge formed by the conjugation tube, moving like an amoeba, and fuses with the opposite protoplast, which now has also contracted and rounded up. In fusing to form a *zygote*, the two nuclei unite and the two cytoplasms mingle, but apparently the two chloroplasts do not, one disintegrating.

The two protoplasts may be termed the migratory and the stationary, but because of obvious similarities to the sexual process in higher organisms, they are more generally termed male and female, although no visible differences between the strands or their contents exist. What has been an individual vegetative cell becomes a sex cell or *gamete*, and because all the gametes are alike structurally, the condition is termed *isogamy* (equal-gametes). However, since one becomes motile and moves to the other, which remains sedentary, the case is also like that of organisms exhibiting *heterogamy* (unlike gametes; i.e., sperms and eggs). As Fuller and Tippo put it, conjugation in spirogyra may be described as morphological isogamy but physiological heterogamy. By extrapolation, the migratory gamete is dubbed the male and it is this one that apparently loses its chloroplast during the process of fusion. In the usual course of events all the cells of a particular strand become male, or all become female, at the same time. It sometimes happens that adjacent cells in the same filament will conjugate, and this is termed *lateral conjugation*.

The zygote now secretes a thick wall and the strands begin to settle to the bottom of the stream. When the old cell walls disintegrate the zygote is freed and undergoes a reduction division. The nucleus divides twice to form four daughter nuclei, three of which degenerate, the fourth remaining as the single nucleus of the first vegetative cell that germinates from the zygote weeks, months, or a year later.

Other algae, considered as on the main

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line of evolution leading to higher plants, exhibit marked heterogamy and also *alternation of generations*, that phenomenon so characteristic of all plants above the thallophytes. *Ulothrix*, for example, forms within any of its vegetative cells a number of flagellated zoospores that are set free and are capable of reproducing a new colony unaided. A vegetative cell may also develop flagellated gametes. This alga is isogamous, and when two gametes of identical appearance become free, swim about and fuse, a zygote is formed. *Oedogonium* goes further and is heterogamous, *Ulva* shows alternation of generations. These and other species constitute a series in the green algae, any one of which would have been an excellent selection in order to give the student an idea of a "typical" member of the Chlorophyta. But *Spirogyra*, with its lack of a sporophyte generation, its absence of zoospores and of flagellated gametes, its want of any orthodox method of vegetative reproduction of filaments, and its oddly shaped chloroplast, continues a laboratory favorite and goes gracefully floating along through manual after manual, although it is the wrong alga.

THE OUTER EDGE OF THE BARELY POSSIBLE

WHEN Dr. Frits Zernicke, Nobel prizewinner for his invention of the phase-contrast microscope, visited the underground Grating Ruling Laboratory at Bausch & Lomb, he, like everyone else, was completely amazed at what he saw. He watched while the resolving power of an eight-inch grating was checked. The grating required a week to rule, and has 120,000 parallel grooves, or 15,000 per inch. Of precisely the same depth, width and contour, these grooves are ruled into a glass surface coated with aluminum twenty-millionths of an inch thick.

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These gratings are in use in numerous research centers, according to an article in *Balco News*, including the Los Alamos Scientific Laboratory, and provide the basis for making spectral analyses of unknown substances.

SONGS FOR ZOOLOGY

Begin With the Skin

Begin the Beguine

Cole Porter

When they begin with the skin
It brings back a day, last session of college,
It brings back a test of practical knowledge,
It brings back a quiz that I was in.
I'm back here again, repeating the course,
But still have no yen for comparative lab. quiz,
And so now and then I'm wearing a drab phyz,
When they begin with the skin.
They set out a shark with his arteries numbered,
His cranial nerves bore little white flags,
And there was I, dumber than any dumb bird,
Searching for some word to write on the tags.
And then came the slides and exhibits of skin,
Keratinized and with scutes and scales ornamental,
Some of the sections were beauts with nails tegumental,
My knowledge of which is all too thin.
So don't let them begin with the skin,
Let them trot out the good old skull and pelvic girdle,
For to me the hide is a dull and difficult hurdle,
When they begin with the skin.
Oh yes, let them begin with the skin, make them use
All their mounts of buffalo and alligator,
Let me learn all that I must know sooner or later,
Then maybe I'll win,
And be able to grin,
When they begin with the skin.
When they begin with the skin.

Human Anatomy

Once in many dozens of reviews it is our privilege to comment on one of the few really great books of modern times. The present example is certainly a best seller, since it was first issued in 1858 and is going stronger than ever as its 26th edition, almost a centennial one, comes from the press. It would scarcely be recognized as such, however, save by that specialized clientele, the medical profession, for the work is Gray's *Anatomy*, a text for medical students and a reference for physicians and surgeons second to none in its field, and relied on as the final authority by many generations in all English-speaking countries.

When Henry Gray, of St. George's Hospital, London, wrote his *Anatomy of the Human Body* his most sanguinary hopes could hardly have envisioned 26 editions, spanning a century, with a steadily increasing success. The present editor is Charles Mayo Goss, Professor of Anatomy at the Louisiana State University School of Medicine, New Orleans, and Managing Editor of the *Anatomical Record*.

In his preface, Dr. Goss states that whenever a change was contemplated, he would consult the first edition and frequently revert to the original instead of piling one change on another until the book should bear little resemblance to Gray's masterpiece. As a result the present edition is recognizable as the product of Gray and his accomplished illustrator, Dr. Vandyke Carter. This does not mean to belie the obvious need for additions and changes to keep the volume up to date, and there have been many of these through the years. Some principal alterations in the 26th Gray are: complete revisions of the autonomic and peripheral nervous systems; a separate chapter for the heart, now treated in fuller detail; the chapter on surface and topographical anatomy has been revised and shifted forward to second place; and both the embryological and histological materials have been rewritten and augmented. There are numerous new and excellent illustrations.

The publishers have done their part in making this one of the most attractive of texts. The use of color in the illustrations is lavish; the legends of all illustrations have been reset in larger type, easier to read; and the binding is extremely sturdy to withstand years of hard usage and permits this thick volume to be opened and lie flat at any page, a most important feature in the dissecting room.

While the subject is technical, much of this famous book can be consulted by the non-professional with profit; the illustrations alone constitute an atlas of anatomy. The authority is unexcelled, the presentation clear and precise, and the fact that the subject index covers 45 pages of small print indicates the exhaustive nature of the coverage. Every library should make Gray available to its readers. Pp. 1480; figs. frontisp., 1202, mostly in color. Lea & Febiger, Washington Square, Philadelphia 6, 1954. $16.00.

PUBLISHERS MERGE

ONE of the most honored names in the scientific publishing field in the United States passed from the scene as of November 1, 1954. The Blakiston Company, long a notable Philadelphia house, specializing in medical works and with always a number of leading items in the biological sciences, moved to New York and subsequently was acquired by McGraw-Hill.

Enquiries regarding Blakiston publications should now be addressed to Miss Mary Furlong Moore, Blakiston Division, The McGraw-Hill Book Co., Inc., 330 West 42d St., New York 36, N. Y.

SONGS FOR THE LABORATORY

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A Pretty Girl is Like a Melody

Irving Berlin

A homely girl is like an artery
That pressures you in vein.
Just like the cir-
Cle of Willis is her
Assault upon your cephalon
To run around your brain.
But you decline to answer heartily
To her diastole—
You forget her and then
She pulsates again,
A homely girl is just like an artery.

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His return, afterward, to his base camp was so uneventful that one of his Eskimos explained it by saying the Devil must either have been asleep or having trouble with his wife.

Actually, good luck of that sort was a rarity to Peary. Enduring intense hardships, he had failed six times before to reach the Pole, but he never gave up. He lived all his life by his personal motto: *I shall find a way or make one.*

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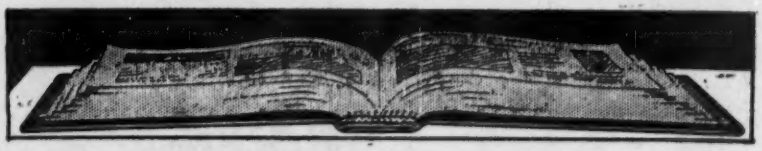

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